CAN THE DEAD BE RE-UNITED?

See Page 1088



# Science and Invention

With which is combined

The EXPERIMENTER

April

25 Cents

40 NON-TECHNICAL RADIO ARTICLES



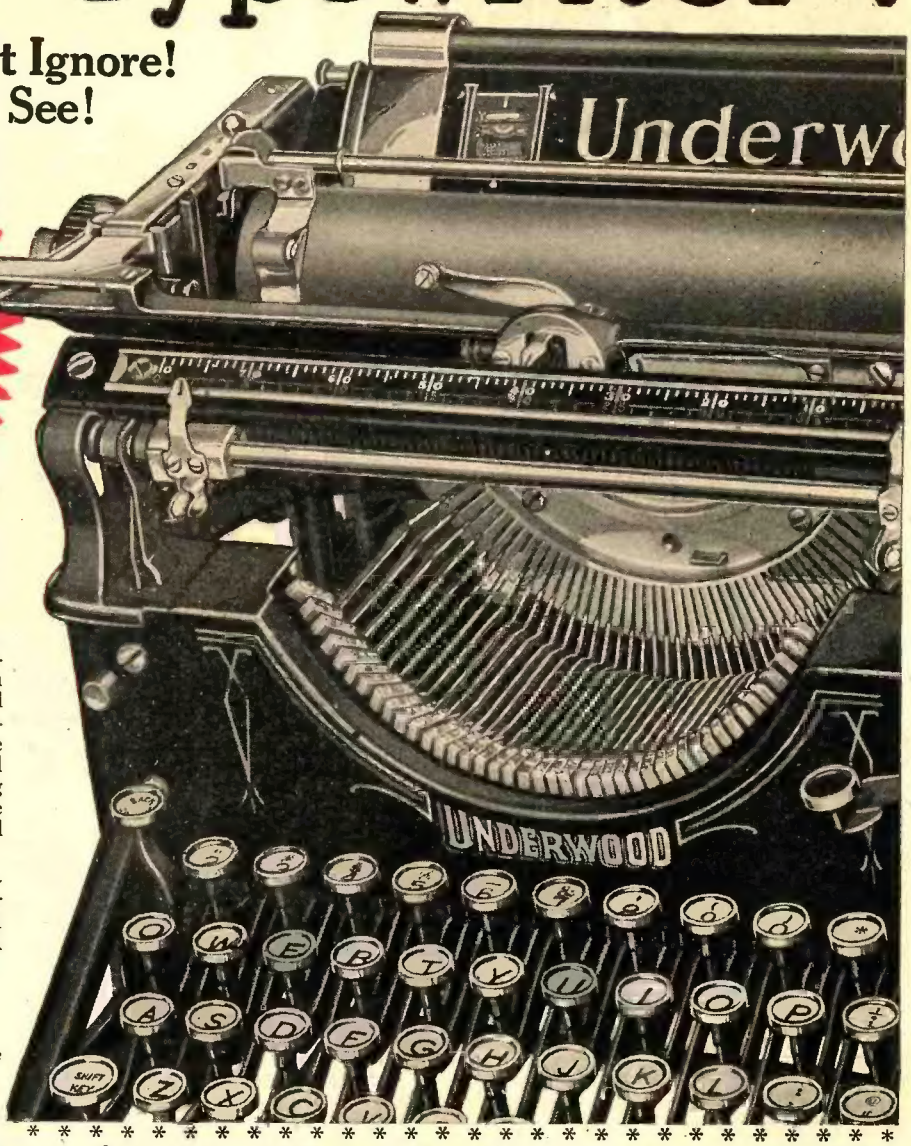

EXPERIMENTER PUBLISHING COMPANY NEW YORK, PUBLISHERS OF
ADIO NEWS - SCIENCE & INVENTION - RADIO REVIEW - AMAZING STORIES - RADIO INTERNACIONAL

www.americanradiohistory.com

# Own a Typewriter !

## A Bargain You Can't Ignore!
## Try It Free, and See!

**$3.00 and It's Yours!**



GET YOUR typewriter *now*. A genuine Shipman-Ward rebuilt Underwood is the one you want—"the machine you will eventually buy!" Everyone needs it; now anyone can afford it. Don't send a cent—but do get our big special offer—our valuable book on typewriters and typewriting—*free*.

You can learn to write on this standard-keyboard machine in one day. A week after the expressman has brought it, you'd feel *lost* without it. A trial will *prove* it—and doesn't cost you a penny!

### A New Plan

Our rebuilt plan gives you the *best* machine and saves you a *lot* of money.

The Underwood is so famous a make, and No. 5 so popular a model, you'll have to speak up if you want one of the lot we are just completing now!

We rebuild from top to bottom; *replace every single worn part;* each machine is in *sparkling* condition. New typewriters are commonly guaranteed for a year; we guarantee these completely rebuilt Underwoods *five years:* That's our Better-Than-New Guarantee! And we guarantee a big saving in money!

**FREE!**

**Mail to** SHIPMAN-WARD MFG. COMPANY 2164 Shipman Building, *Chicago*

Please send me full offer, with Type Writing Manual FREE, prices, terms, etc., and full information about your FREE course in touch Typewriting. All without obligation; this is NOT an order!

*Name*.....

*St. or R. F. D.*.....

*P. O*..... *State*.....

* * * * * * * * * * * * * * * * * * * * * * * * * * * * *

## Act NOW If Ever !

* * * * * * * * * * * * * * * * * * * * * * * * * * * * *

We don't ask for a cent now. Nor any money at all, unless you are completely won by the wonderful writing machine we ship you for an unrestricted 10-day free trial. When you do buy, take advantage of our very liberal scale of monthly payments. A host of our patrons have paid for their typewriters out of money made typing work for others. (One women made *a thousand dollars* at home last year with her Underwood.)

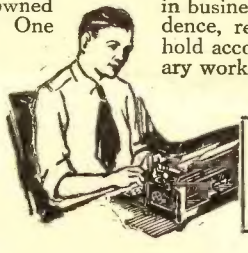
If you know typewriters, you know the perfect work and the ease and speed of an Underwood. If you have never owned a typewriter, start with the finest! One that will last you all your life! But, the time to act is NOW. Don't miss out on this present bargain offer. Don't do longer without the convenience of a typewriter.

### Free Trial Offer

Our plan gives you the opportunity of *a thorough trial* before you buy. You run no risk whatever. You start to pay for your typewriter *after* you have found it the one and only machine for you! But get the facts before this lot of machines is all in use. Clip the information coupon before you turn the page. It will pay you! Note the very useful book you receive free! Write for full particulars at once.

Get our catalog that tells how we rebuild these wonderful Underwood typewriters in the largest factory of its kind in the world, and lowest prices and terms in existence.

We will also include free, the new Type Writer Manual—it gives many examples and samples of uses for your typewriter: in business accounts, social correspondence, recipes, shopping lists, house hold accounts, etc.; school work; literary work, etc. Clip coupon now!



This is a genuine UNDERWOOD Machine —ace of them ALL

www.americanradiohistory.com

# Electrical Experts are in Big Demand!

—L. L. Cooke!

# I Will Train You at Home to fill a Big-Pay Job!

It's a shame for you to earn $15 or $20 or $30 a week, when in the same six days as an Electrical Expert you could make $70 to $200—and do it easier—not work half so hard. Why then remain in the small-pay game, in a line of work that offers no chance, no big promotion, no big income? Fit yourself for a real job in the great electrical industry. I'll show you how.

## Look What These Cooke Trained Men Are Earning

### Makes $700 in 24 Days in Radio

"Thanks to your interesting Course I made over $700 in 24 days in Radio. Of course, this is a little above the average but I run from $10 to $40 clear profit every day, so you can see what your training has done for me."

FRED G. McNABB, 848 Spring St., Atlanta, Georgia

### $70 to $80 a week for Jacquot

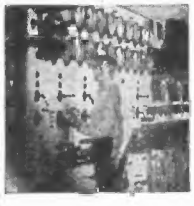
"Now I am specializing in Auto Electricity and battery work and make from $70 to $80 a week and am just getting started. I don't believe there is another school in the world like yours. Your lessons are a real joy to study."

ROBERT JACQUOT, 2005 W. Colorado Ave., Colorado Springs, Colo.

### $20 a Day for Schreck

"Use my name as a reference and depend on me as a booster. The biggest thing I ever did was answer your advertisement. I am averaging better than $500 a month from my own business now. I used to make $18.00 a week."

A. SCHRECK, Phoenix, Arizona



### Plant Engineer—Pay raised 150%

"I was a dumbbell in electricity until I got in touch with you Mr. Cooke, but now I have charge of a big plant including 600 motors and direct a force of 34 men—electricians, helpers, etc. My salary has gone up more than 150%."

GEORGE ILLINGWORTH, 63 Calumet Road, Holyoke, Mass.

## Be an Electrical Expert

## Earn $3,500 to $10,000 a Year

Today even the ordinary Electrician—the "screw driver" kind—is making money—big money. But it's the trained man—the man who knows the whys and wherefores of Electricity—the Electrical Expert—who is picked out to "boss" the ordinary Electricians—to boss the Big Jobs—the jobs that pay $3,500 to $10,000 a Year. Get in line for one of these "Big Jobs." Start by enrolling now for my easily learned, quickly grasped, right-up-to-the-minute, Spare-Time Home-Study Course in Practical Electricity.

### Age or Lack of Experience No Drawback

You don't have to be a College Man; you don't have to be a High School Graduate. As Chief Engineer of the Chicago Engineering Works, I know exactly the kind of training you need, and I will give you that training. My Course in Electricity is simple, thorough and complete and offers every man, regardless of age, education, or previous experience, the chance to become, in a very short time, an "Electrical Expert," able to make from $70 to $200 a week.

### No Extra Charge for Electrical Working Outfit

With me, you do practical work—at home. You start right in after your first few lessons to work at your profession in the regular way and make extra money in your spare time. For this you need tools, and I give them to you—5 big complete working outfits, with tools, measuring instruments, and a real electric motor—5 outfits in all.

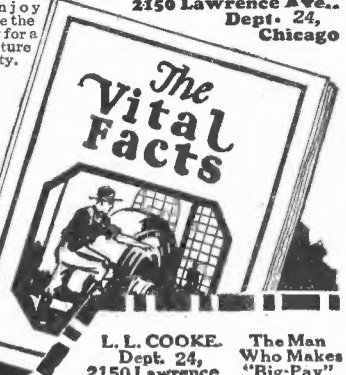
### Your Satisfaction Guaranteed

So sure am I that you can learn Electricity—so sure am I that after studying with me, you, too, can get into the "big money" class in electrical work, that I will guarantee under bond to return every single penny paid me in tuition, if, when you have finished my Course, you are not satisfied it was the best investment you ever made. And back of me in my guarantee, stands the Chicago Engineering Works, Inc., a two million dollar institution, thus assuring to every student enrolled, not only a wonderful training in Electricity, but an unsurpassed Student Service as well.

**Get Started Now—Mail Coupon**

I want to send you my Electrical Book and Proof Lessons, both Free. These cost you nothing and you'll enjoy them. Make the start today for a bright future in Electricity. Send in Coupon—NOW.

L. L. Cooke, Chief Engineer
**Chicago Engineering Works**
**2150 Lawrence Ave., Dept. 24, Chicago**




# 5 big outfits given to you—no extra charge

MAIL COUPON FOR MY FREE BOOK

L. L. COOKE, Dept. 24, 2150 Lawrence Ave., Chicago — The Man Who Makes "Big-Pay" Men

Send me at once without obligation your big illustrated book and complete details of your Home Study Course in Electricity, including your outfit and employment service offers.

Name.....

Address.....

Occupation.....

*The "Cooke" Trained Man is the "Big Pay" Man*


www.americanradiohistory.com

Vol. XIII.
Whole No. 156

# Science and Invention

FORMERLY

## ELECTRICAL EXPERIMENTER

COMBINED WITH "THE EXPERIMENTER"

*Member Audit Bureau of Circulations*

April, 1926
No. 12

EDITORIAL & GENERAL OFFICES: 53 Park Place, New York City
GENERAL ADVERTISING DEPT.: 53 Park Place, New York City
Published by Experimenter Publishing Company, Inc.
(H. Gernsback, Pres.; S. Gernsback, Treas.; R. W. DeMott, Sec'y).

Publishers of SCIENCE & INVENTION, RADIO NEWS, RADIO INTERNACIONAL, RADIO REVIEW and AMAZING STORIES

## EDITORIAL STAFF

HUGO GERNSBACK, *Editor-in-Chief.*

H. WINFIELD SECOR, E. E., *Managing Editor.*

DR. T. O'CONOR SLOANE, Ph.D., M. A., *Associate Editor.*

JOSEPH H. KRAUS, *Field Editor.*

A. P. PECK, Assoc. I. R. E., *Radio Editor.*

S. GERNSBACK, *Wrinkles Editor.*

M. ESSMAN, *Art Director.*

## CONTRIBUTING EDITORS

*Astronomy—*
Dr. Donald H. Menzel, Ph.D., Ohio State University.
Isabel M. Lewis, M.A., of the U. S. Naval Observatory.
*Entomology and Allied Subjects—*
Dr. Ernest Bade, Ph.D.
*Physics—*
Dr. Harold F. Richards, Ph.D.
Ernest K. Chapin, M. A.
Dr. Donald H. Menzel, Ph.D., Ohio State University.
*Automotive Subjects—*
Tom C. Plumridge.
George A. Luers.
*Chemistry—*
Raymond B. Wailes.
Dr. Ernest Bade, Ph.D.
*Radio—*
Sylvan Harris.
Leon L. Adelman.
*Magic and Psychic Phenomena—*
Joseph Dunninger.
Joseph F. Rinn.
Edward Merlin.
*Foreign Correspondents—*
Dr. Alfred Gradenwitz, Germany.
Dr. H. Becher, Germany.
C. A. Oldroyd, England.
S. Leonard Bastin, England.
Count A. N. Mirzaoff, France
Hubert Slouka, Czecho-Slovakia.
P. C. van Petegem, Holland.
Richard Neumann, Austria.

## IN OUR NEXT ISSUE

### *Hot Gas for Dirigibles.*

The new art of heating gas for dirigibles is a most interesting one and an aeronautical engineer will describe in detail the methods and apparatus used.

### *Are Ants Organized?*

They are indeed and a description of their home life will be found, together with various interesting and instructive illustrations.

### *Safety on the Railroads.*

Did you know that a train, when properly equipped, can be automatically stopped even though traveling at a speed of 60 miles an hour, in case the engineer should thoughtlessly pass a stop signal?

### *Can Stars be Seen in Daytime From a Deep Well?*

This is an old superstition and reasons for its existence as well as its fallacy will be given by an astronomer.

### *How are Movie Sub-Titles Made?*

This is a most interesting phase of motion picture work that is not very well known. In an interesting article, you will find many details of this work.

## Contents for April

Editorial .....1081
*By Hugo Gernsback.*
Safety On Submarines .....1082
Medical Frauds .....1084
*By Joseph H. Kraus.*
Electric Snow Eliminator .....1085
*By Jay Kay London.*
"Antinoe" Photos Cabled Across Atlantic .....1086
*By H. Winfield Secor, E. E.*
Can the Dead Be Reunited? .....1088
*By Hugo Gernsback.*
Electro-Chemistry Restores Ancient Bronzes .....1090
New Steel Resists Great Heat .....1091
The New Cosmic Ray .....1092
Greatest Three Figure Number ....1093
*By Hubert Slouka.*
Under-Sea Volcanoes .....1093
*By Ernest Brennecke.*
New Plane Seeks Altitude Record..1095
*By William P. Sullivan.*
Distribution of Electricity .....1095
New Electric Refrigerator .....1096
New Photograph Accessories .....1096
The Story of Coal .....1077
*By J. E. Byron.*
Awards In the Matchcraft Contest.1098
Telephone Amplifier For the Deaf..1101
A Musical Talking Machine .....1101
Photos From the Scientific World..1102
The Month's Science News Illustrated .....1103
*By George Wall.*
Tarrano The Conqueror.....1104
*By Ray Cummings.*
Magic by Dunninger .....1106
Awards In the Rat Trap Contest...1107
Model Department .....1108
Model Boiler .....1109
Everyday Chemistry .....1111
*By Raymond B. Wailes.*
Experimental Chemistry .....1112
Experimental Electrics .....1114
Junior Electrician .....1116
Cooling and Humidifying System..1118
Utilizing Electric Fans for Power..1118
Is There a Battery in Your Mouth..1119
*By Clyde E. Volkers.*
Mysterious Jar of Water .....1119
*By C. A. Oldroyd.*
How-to-Make-It Department ... ...1120
Readers' Forum .....1121
Wrinkles, Recipes and Formulas...1122
*Edited by S. Gernsback.*
Latest Radio Broadcast News .....1124
WRNY For New York Visitors ....1125
*By Charles D. Isaacson.*
The Radio Constructor .....1126
*By A. P. Peck, Assoc. I. R. E.*
A Five Tube Tuned R. F. Receiver 1128
A Highly Efficient Six Tube Receiver .....1129
*By L. Adams*
Radio Oracle .....1130
Latest Patents .....1131
Scientific Humor .....1132
Oracle .....1133
Radio Broadcast Calls .....1152
Radio Wrinkles .....1150
Patent Advice .....1140
*Edited by A. P. Peck.*

HOW TO SUBSCRIBE FOR "SCIENCE AND INVENTION." Send your name, address and remittance to Experimenter Publishing Co., 53 Park Place, New York City. Checks and money orders should be made payable to Experimenter Publishing Co., Inc. Mention the name of the magazine you are ordering inasmuch as we also publish RADIO NEWS, RADIO INTERNACIONAL, RADIO REVIEW and AMAZING STORIES. Subscriptions may be made in combination with the other publications just mentioned at special reduced club rates. Send postal for club rate card. Subscriptions start with the current issue unless otherwise ordered.
ON EXPIRATION of your subscription we enclose a renewal blank in our last number to you, and notify you by mail. Then unless we receive your order and remittance for a renewal, delivery of the magazine is stopped.
CHANGE OF ADDRESS: Notify us as far in advance as possible, giving your old address as well as the new one to which future magazines are to go. It takes several weeks to make an address change on our records.

SCIENCE AND INVENTION is published on the 10th of each month. There are 12 numbers per year. Subscription price is $2.50 a year in U. S. and possessions. Canada and foreign countries $3.00 a year. U. S. coin as well as U. S. stamps accepted (no foreign coin or stamps). Single copies, 25 cents each. A sample copy will be sent gratis on request. All communications and contributions to this journal should be addressed to Editor, SCIENCE AND INVENTION, 53 Park Place, New York City, N. Y. Unaccepted contributions cannot be returned unless full postage has been included. ALL accepted contributions are paid for on publication.

SCIENCE AND INVENTION. Monthly. Entered as second class matter May 10, 1924, at the Post Office at New York, N. Y., under the act of March 3, 1879. Additional entry at Long Island City, N. Y., and San Francisco, Calif. Title Registered at the Patent Office. Copyright, 1926, by E. P. Co., Inc., New York. The Contents of this Magazine are copyrighted and must not be reproduced without giving full credit to the publication. SCIENCE AND INVENTION is for sale at all newsstands in the United States and Canada. European Agents, S. J. Wise Et Cie, 40 Place Verte, Antwerp, Belgium.

New England Advertising Representative
T. F. Magrane
Park Square Bldg., Boston, Mass.

Western Advertising Representatives
Finucan & McClure
720 Cass St., Chicago, Ill.

Pacific Coast Advertising Representatives
A. J. Norris Hill Co.
Hearst Bldg., San Francisco, Cal.

Kansas City Advertising Representatives
Davies & Dillon
15 W. 10th St., Kansas City, Mo.

www.americanradiohistory.com

# 3 Drafting Lessons Actually FREE!

***to Prove You Can Learn at Home in Spare Time!***

We have invented a new, simplified way to teach Drafting—the first real improvement in Drafting home-instruction in history. We want you to see it, try it—without one penny of cost or obligation. We want to show you how we get away from the **copying** methods used in the past. See how we make you **think,** solve problems, do actual drafting room jobs **from the first lesson!**

## I WILL MAKE this Contract with You—

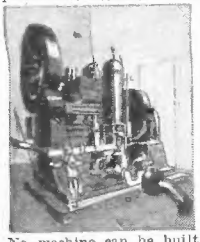
When you enroll for our home-training in Drafting, we agree to give you:

1. Complete Drafting training, by the new Practice-Method.
2. Professional Drafting Outfit, as illustrated.
3. *We will help you get a good Drafting position* at a substantial increase in pay.
4. Or we'll refund every cent of your money.

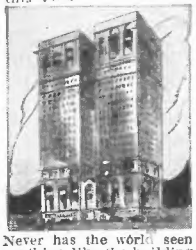
AMERICAN SCHOOL —the Million Dollar Educational Institution

*Director Extension Work*

The American School, a million dollar *No-Profit* Educational Institution now offers men a *double* service—training for a specific job, then finding the job. For one small price, on terms of only $5 a month, you are now assured of definite benefits, both in position and salary. Write for complete information—*today!*



No machine can be built until the Draftsman first builds it on paper. My training prepares you for this work.



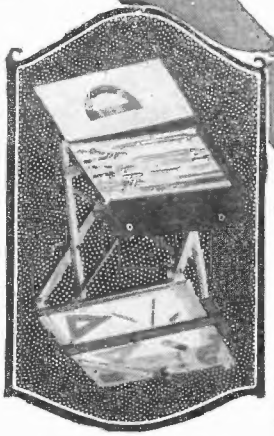
Never has the world seen anything like the building boom of today. This has created enormous demand for real Draftsmen.

## FREE Job Service!

*The American School* now offers its students and graduates, without cost, the services of an efficient Employment Department keeping in constant touch with employes of Draftsmen all over the United States. *We have placed hundreds of men in good big-pay Drafting positions.* We've made this training so complete, so practical, so easy to master, that our students *are bound to make good.* And, so, because the demand for real Draftsmen continues to exceed the supply, and because this training actually prepares men for good Drafting positions, *we back it with a Free Employment Service.*

## WIN SUCCESS THRU DRAFTING

Drafting is easy, fascinating work. Short hours. Big pay. And the Draftsman is always in line for promotion for executive positions. This training is Complete. It includes high-school subjects. (if you need them) and all the Engineering and M-a-t-h-e-matics Drafting Experts require.



## Costly Drafting Outfit Given!

Fine, imported instruments like these help you learn Drafting quickly and easily. These standard quality, full size instruments, board, table, triangles, T square, ink, protractor, etc., given to every student without extra cost.

## Draftsmen Wanted! $60 to $125 a Week!

70,000 fine jobs advertised last year. Get ready to fill one. Get out of the rut. Make something of yourself. Plan your future in Drafting. Even if you have only common schooling, even if you know nothing of Drafting, we guarantee to make you a real Draftsman *or to refund your money!* Special surprise offer right now to the first 500 men who answer this ad—reduced price, easy terms. Coupon brings complete information.

***A new, rapid, simplified training***

Copying drafting lessons prepares you to be only a "tracer." This new "Job-Method" gives you actual drafting-room jobs in a new one-step-at-a-time way. With *pictures* which you can understand almost without reading the "lessons." And that is why the American School-trained Draftsmen can qualify for a good job at big pay when they graduate.

## 5 BIG-PAY Branches

The big money in Drafting goes to men who specialize in Machine Design, or Electrical Drafting, or Architectural Drafting, or Structural, or Automotive. It is not enough merely to know *general* Drafting practice. You must know how to calculate and design and plan original work. You need many Engineering subjects to fill the kind of a Drafting position that pays $60 to $125 a week. The American School *now includes this specialized training in its Drafting course.*

## *Coupon Brings 3 Lessons* FREE!

Get them. Test your own ability to learn Drafting and get ready for a fine job and big pay. Coupon also brings surprise offer, and complete information about your opportunities for success in Drafting. *Mail It Today!*

Electricity needs Draftsmen who know Electrical principles as well as general Drafting practice. I give you this training.

The demand for Draftsmen experienced in concrete and structural steel work is enormous. Many big-pay positions open.

Every great Auto factory employs Draftsmen who specialize in Automotive work—men who design bodies, plan engines, etc.

O. C. MILLER, Director EXTENSION WORK **AMERICAN SCHOOL** Dept. D-426 Drexel Ave. & 58th St. CHICAGO

**3 Drafting Lessons Actually FREE!**

O. C. MILLER. Director of Extension Work

**AMERICAN SCHOOL**

Dept. D-426, Drexel Ave. & 58th St., Chicago.

Rush 3 Free Drafting Lessons, Job and Raise offer, complete information, money-back guarantee, etc., to prove I can become a real Draftsman at home in spare time.

Name .....

Street No. .....

City ..... State.....


www.americanradiohistory.com

# INDEX TO ADVERTISERS


A — Page

American Correspondence School of Law ....1142
American School of Correspondence ....1152, 1075
American Technical Society ...1154
American Tel. & Tel. Co. ....1147
Anita Company ....1161
Arrow Battery Co. ....1151
Artcraft Studios ....1163
Atlas Moving Picture Co. ....1157
Audel & Co., Theo. Inside Back Cover

B

Baby Calculator Sales Co. ....1154
Balda Art Service ....1165
Belmont Hotel ....1154
Bliss Electrical School ....1163
Bogue Institute for Stammerers 1152
Bremer-Tully Mfg. Co. ....1146
Brinkler School of Eating ....1161
Buescher Band Instrument Co. 1150
Buffalo Wire Co. ....1161
Bureau of Inventive Science....1077

C

Chemical Institute ....1079
Chicago Engineering Works ...1073
Chicago Solder Company....1153
Chicago Technical College....1152
Chicago Tenor Banjo Institute 1150
Clarkson, David B., ....1154
Coleman, Watson E. ....1142
Conn, C. G., Ltd. ....1152
Consrad Co., Inc. ....1162
Coyne Electrical School Back Cover

D

Davis Co., E. M. ....1163
Dawson Real Estate Corp. ...1155
Douglas, Lyle ....1150
Drake Co., F. J. ....1163

E — Page

E. I. Company ....1078
Elto Outboard Motor Company 1163
Erie Fixture Supply Co....1161
Evans, Victor J. ....1143

F

Fawcett Publications, Inc. ....1155
Federal Mail Order Corp. ....1163
First Hawaiian Conservatory of Music ....1163
Fisher Mfg. Co., Adam ....1142
Franklin Institute ....1149

G

General Electric Company....1149
Gerold Company, The ....1161
Gilson Slide Rule Co. ....1165
Givens Chemical Company ....1138

H

Hardin-Lavin Co. ....1152
High School Study Bureau....1159
Hobart Bros. ....1146
Hotel Times Square ....1156

I

Inkograph Co., Inc. ....1153
International Body Works ....1161
International Correspondence Schools....1138, 1150, 1155, 1165
International Studios ....1157
Irwin Aircraft Company....1154

J

Johnson, Smith & Co. ....1137

L

Lacey & Lacey ....1140
Lancaster & Allwine ....1140
LaSalle Extension University ..1142
Lewers, R. J. ....1155
Liggett & Myers Tobacco Co. 1151

Mc

McGraw-Hill Book Co....1145, 1150

M — Page

Mead Cycle Company ....1161
Metal Arts Co. ....1163
Metal Cast Products Co. ....1153
Mellinger Tire & Rubber Co...1154
Metropolitan Motion Pic. Co. 1161
Meyer Both Company ....1138
Mid-West Radio Corp. ....1138
Miller, Monroe ....1142
Modelmaker ....1161
Modern Engine & Supply Co...1161
Munn & Company ....1142
Mussehl & Westpal ....1142

N

National Electrical School....1136
National Carbon Co....1135
Natural Body Brace Co....1165
Nelson Mfg. Co. ....1154
New England Novelty Co. ....1163
New Method Mfg. Co. ....1165
New York Electrical School..1144
North American Institute ....1080

O

O'Brien, Clarence A. ....1141
Ogilvie Publshing Co. ....1165
Open Court Publishing Co. ..1159
Orr, T. V. ....1168
Owen, Richard B. ....1140
Ozment, C. J. ....1155

P

Page Davis School ....1157
Parker, C. L. ....1142
Parks Ball Bearing Machine Co. ....1159
Perfect Sales Co. ....1165
Photion Electric Corp. ....1152
Pittle & Co., Charles ....1165
Plapao Company ....1159
Polachek, Z. H. ....1142

Page

Polk & Co., R. L. ....1151
Porter Chemical Company ...1138
Practical Mechanics ....1157
Press Company ....1163

R

Radio Association of America..1144
Radiogem Corp., The ....1148
Radio Specialty Co. ....1139
Randolph & Company ....1140

S

S & H Engineering Co. ....1157
Sargent, L. L. ....1142
School of Engineering ....1157
Shipman-Ward Co., Inside Front Cover
South Bend Lathe Works ....1138
Spors & Co., F. ....1147
Stauffer, Mack ....1163

T

Tamblyn School ....1157

U

Universal Sales Co. ....1155
University of Chicago ....1161
University Extension Conservatory ....1165

W

Washington Jewelry Co. ....1146
Washington School of Art....1163
Washington Show Card School 1159
Western Airplane Corp. ....1165
Witte Engine Works ....1155
World Battery Co. ....1150

Y

Young Typewriter Company...1161


# SCIENCE and INVENTION READERS' BUREAU

TEAR ALONG THIS LINE

## *Time and Postage Saver*

IN every issue of SCIENCE AND INVENTION you undoubtedly see numerous articles advertised about which you would like to have further information.

To sit down and write an individual letter to each of these respective concerns, regarding the article on which you desire information, would be quite a task.

As a special service to our readers, we will write the letters for you, thus saving your time and money.

Just write the names of the products about which you want information, and to avoid error the addresses of the manufacturers, on the coupon below and mail it to us.

If the advertiser requires any money or stamps to be sent to pay the mailing charges on his catalog or descriptive literature, please be sure to enclose the correct amount with the coupon. We will transmit to the various advertisers your request for information on their products.

This service will appear regularly every month on this same page in SCIENCE AND INVENTION.

READERS' SERVICE BUREAU, S&I-4-26

**EXPERIMENTER PUBLISHING CO., Inc., 53 Park Place, New York, N. Y.**

Please advise the firms listed below that I would like to receive detailed information on their product as advertised in the ..... issue of SCIENCE AND INVENTION.

**This form should not be used for technical questions.**

| NAME | ADDRESS (Street—City—State) | List here specific article on which you wish literature. | If Catalogue of complete line is wanted check in this column. |
|---|---|---|---|
| | | | |
| | | | |
| | | | |

Your name.....

Your address.....

☐ If you are a dealer, check here. City..... State.....

Dealer's name.....

His address.....

City..... State.....

www.americanradiohistory.com

# HOW TO INVENT— WHAT TO INVENT

## and What to Do About Protecting and Selling An Invention

ALTHOUGH the fact has been universally recognized that Invention is governed by a few simple, easily acquired, fundamental principles, no one ever thought of putting these principles in black and white so that everybody interested in invention could read them. In spite of the fact that Thomas A. Edison made his famous statement that invention should be taugh' as a science, thousands of people continued to work blindly, doggedly, haphazardly to perfect their ideas.

But now anyone can learn how to invent. Fifteen famous inventors have at last given to the world the laws and principles of Inventive Science. They have shown every ambitious man and women how to invent. They are teaching Invention exactly as other people are teaching law, medicine, bookkeeping. Instead of spending years groping blindly, instead of wasting your time in useless, heartbreaking drudgery, you learn how to complete your ideas quickly *and what to do about them* when they are completed. You learn how to think so you are sure to succeed.

**—How to develop your imagination**
**—How to develop your ideas**
**—How to get the facts you need for inventions**
**—How to keep legal records of ideas**
**—How to use scientific principles of mechanics**
**—How to avoid wasting time on impractical inventions**
**—How to apply for a patent**
**—How to organize a company**
**—How to protect your rights**
**—How to market a patent**
**and hundreds of other vitally important facts which EVERY successful inventor knows and uses.**

Raymond F. Yates, who with fourteen other famous inventors now makes it easy for you to learn how to invent in your spare time at home.

### Everybody Invents

For a long time it was commonly believed that every invention was a matter of pure luck—the result of some happy inspiration that suddenly flashed through a man's brain, and which made him fabulously rich without the slightest effort or thought. But you can prove for yourself that this is not so. You can prove for yourself that invention is the result of thinking and action along definitely exact, scientific lines.

Suppose when you went home tonight you found a window rattling. Through your mind would flash, almost instinctively, a regular order of thoughts which characterize the coneption and completion of every invention the world has ever known. First, you would recognize a problem to be solved—the rattling of the window. Then you would think of several principles of science or mechanics which would solve your problem. You might think of the scientific fact that if you poured water on the frame the wood would swell and tighten the window. You might think of using a nail. But what you most poobably would do would be to use the oldest mechanical principal known to man, the wedge.

### What Invention is

Brought down to its simplest terms, that is exactly the way every invention has been made—combining two ideas; a problem which mustt be solved and a fact of mechanics or science which solves the problem. So, although you may never have thought of it just this way, every time you solve a problem in you daily life—at home, traveling, or in business—you are an inventor; you use the principles of thought and action which govern the Science of Invention!

You can see, therefore, how easy it is for you to develop your natual instinct to "fix things." The same processes of thought that almost instinctively told you to fix a rattling window with a wedge can be so well developed that you can learn to invent other things almost as easily and quickly. You know, too, that every invention is made only by thinking inventively. And every inventor is agreed that the principles of Inventive Science are so simple, so easy to learn that anyone, regardless of training or education, can develop himself to become a successful inventor!

With every new advance, with every new discovery that the world experiences, more problems are coming up—and more inventions are needed to solve these problems. Now, as never before, are new inventions wanted, and the world will pay a fortune to the man or woman who gives it just one of the inventions it needs.

Even little ideas can bring you a fortune. Eberhard, who invented the rubber on the end of a pencil, has been paid hundreds of thousands of dollars for his simple idea. The man who invented the metal tip for shoelaces, the man who conceived the idea of the "humped" hairpin, the man who developed the metal tape measure, all have achieved success and wealth as great or greater than the inventors of large machinery.

### Learn How to Invent at Home

If you would like to develop your natural inventive ability along *money-making* lines, instead of trifling with ideas—if you would like to DO something about your ideas instead of letting someone else patent and market them ahead of you, let this great Course in Inventive Science help you. Get the advice and help of the fifteen famous inventors who tell you the secrets of invention which you MUST know to be successful.

This is the first course in practical invention that has ever been devised. In simple, easy-to-understand language you are told how successful inventors work; you learn how to think along inventive lines, you learn the short-cuts to successful invention; you learn how to use the secrets of invention that convert a simple little idea into money.

No one step in invention has been omitted. Everything you want to know about invention—developing your ideas, securing information you need, how to apply for patents, how to protect your rights, how to sell your invention—are taken up step by step, so that when you have completed the course you have a wealth of information worth thousands upon thousands of dollars.

### FREE New Book on Inventive Science

A wonderful new book has just come from the press that tells you all about the Science of Invention. It tells you how to avoid the pitfalls that have brought failure to thousands of would-be inventors. It tells you how to learn the secrets of practical invention, which famous inventors discovered only after years of heart-breaking effort and discouraging mistakes, and it tells you how to do this in only fifteen minutes of your spare time each day. This book will be sent you free if you are inventively inclined, or if you have some idea in mind for an invention. We cannot afford to send this book to those who are merely curious or to children. If you are genuinely interested, however, be sure to send for this book today. Write your name and address on the coupon below or send a postcard NOW! This bureau is not connected in any way with patent attorneys or manufacturers. Our only work is to help ambitious men and women to develop their inventive ability—to become successful inventors.

**Bureau of Inventive Science**
**Dept. 74, Wisner Building, Rochester, N. Y.**

**BUREAU OF INVENTIVE SCIENCE**
**Dept. 74, Wisner Building**
**Rochester, New York**

I am over 18 years of age, and am interested in your Course in Inventive Science. Please send me your Free Book about the Course.

Name .....

Address .....

City .....State.....

www.americanradiohistory.com

# Trouble Finding and Correcting Simplified for Everyone

No matter how much or how little you know of your radio receiver, this new "Radio Trouble Finder" book is going to be a big help.

It explains the common and special faults of all the standard receivers of today; tells how to recognize instantly, by various sounds, where the trouble lies and also gives special simple tests by which you can determine what is wrong with your receiver. Then for each particular fault there is explained the proper procedure for correcting it.

All troubles and their remedies are arranged in simple charts so that even the most inexperienced radio user will have no trouble in keeping his set at all times in first class condition.

All parts of the radio set are illustrated to show the layman how to proceed in correcting faults.

THE PRICE OF THIS BIG BOOK IS ONLY 25c. Everyone can afford a copy. Keep one around the house for any emergency. Order today by using the coupon below, enclosing 25c.

**200 Illustrations**

**Size 6 x 9 Inches**

**Sold everywhere on Newsstands and Radio Dealers**

**Published by The E. I. Company**

*Distributed by*

**The Consrad Co., Inc., 64 Church St., New York, N. Y.**

CONSRAD CO., INC.,
64 Church St., New York, N. Y.

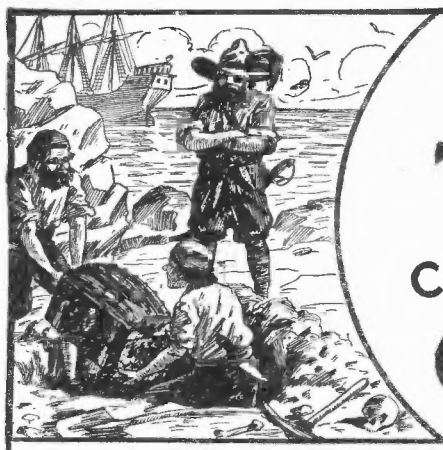
Gentlemen:—I am enclosing 25c. Kindly forward at once one copy of "The Radio Trouble Finder."

*Name* .....

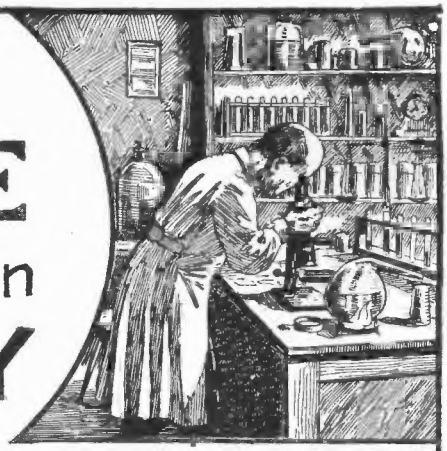
*Address* .....

*City, State* .....

www.americanradiohistory.com



# BURIED TREASURE
## can still be found in CHEMISTRY



# Good Chemists Command High Salaries

## and you can make yourself independent for life by unearthing one of chemistry's yet undiscovered secrets.

T. O'CONOR SLOANE, A.B., A.M., LL.D., Ph.D.
Noted Instructor, Lecturer and Author. Formerly Treasurer American Chemical Society and a practical chemist with many well known achievements to his credit. Not only has Dr. Sloane taught chemistry for years but he was for many years engaged in commercial chemistry work.

Do you remember how the tales of pirate gold used to fire your imagination and make you want to sail the uncharted seas in search of treasure and adventure? And then you would regret that such things were no longer done. But that is a mistake. They *are* done—today and everyday—not on desert islands, but in the chemical laboratories throughout your own country. Quietly, systematically, the chemist works. His work is difficult, but more adventurous than the blood-curdling deeds of the Spanish Main. Instead of meeting an early and violent death on some forgotten shore, he gathers wealth and honor through his invaluable contributions to humanity. Alfred Nobel, the Swedish chemist who invented dynamite, made so many millions that the income alone from his bequests provides five $40,000 prizes every year for the advancement of science and peace. C. M. Hall, the chemist who discovered how to manufacture aluminum made millions through this discovery. F. G. Cottrell, who devised a valuable process for recovering the waste from flue gases, James Gayley, who showed how to save enormous losses in steel manufacture, L. H. Baekeland, who invented Bakelite—these are only a few of the men to whom fortunes have come through their chemical achievements.

### What Some of Our Students Say of This Course:

I have not written since I received the big set. I can still say that it far exceeded my anticipations. Since I have been studying with your school I have been appointed chemist for the Scranton Coal Co. testing all the coal and ash by proximate analysis. The lessons are helping me wonderfully, and the interesting way in which they are written makes me wait patiently for each lesson.—MORLAIS COUZENS.

I wish to express my appreciation of your prompt reply to my letter and to the recommendation to the General Electric Co. I intend to start the student engineering course at the works. This is somewhat along electrical lines, but the fact that I had a recommendation from a reliable school no doubt had considerable influence in helping me to secure the job.—H. VAN BENTHUYSEN.

So far I've been more than pleased with your course and am still doing nicely. I hope to be your honor graduate this year.—J. M. NORKUS, JR.

I find your course excellent and your instruction, truthfully, the clearest and best assembled I have ever taken, and yours is the fifth one I've studied.—JAMES J. KELLY.

From the time I was having Chemistry it has never been thus explained to me as it is now. I am recommending you highly to my friends, and urging them to become members of such an organization.—CHARLES BENJAMIN.

I shall always recommend your school to my friends and let them know how simple your lessons are.—C. J. AMDAHL.

I am more than pleased. You dig right in from the start. I am going to get somewhere with this course. I am so glad that I found you.—A. A. CAMERON.

I use your lessons constantly as I find it more thorough than most text books I can secure.—WM. H. TIBBS.

Thanking you for your lessons, which I find not only clear and concise, but wonderfully interesting. I am—ROBT. H. TRAYLOR.

I received employment in the Consolidated Gas. Co. I appreciate very much the good service of the school when a recommendation was asked for.—JOS. DECKER.

## Now Is the Time to Study Chemistry

Not only are there boundless opportunities for amassing wealth in Chemistry, but the profession affords congenial employment at good salaries to hundreds of thousands who merely follow out its present applications. These applications are innumerable, touching intimately every business and every product in the world. The work of the chemist can hardly be called work at all. It is the keenest and most enjoyable kind of pleasure. The days in a chemical laboratory are filled with thrilling and delightful experimentation, with the alluring prospect of a discovery that may spell Fortune always at hand to spur your enthusiasm.

## You Can Learn at Home

To qualify for this remarkable calling requires elaborate specialized training. Formerly it was necessary to attend a university for several years to acquire that training, but thanks to our highly perfected and thorough system of instruction, you can now stay at home, keep your position, and let us educate you in Chemistry during your spare time. Even with only common schooling you can take our course and equip yourself for immediate practical work in a chemical laboratory. Dr. Sloane gives every one of his students the same careful, personal supervision that made him celebrated throughout his long career as a college professor. Your instruction from the very beginning is made interesting and practical, and we supply you with apparatus and chemicals for performing the fascinating analyses and experimental work that plays such a large part in our method of teaching, and you are awarded the Institute's official diploma after you have satisfactorily completed the course.

## Experimental Equipment Furnished to Every Student

We give to every student without additional charge this chemical equipment, including forty-nine pieces of laboratory apparatus and supplies, and forty different chemicals and reagents. These comprise the apparatus and chemicals used for the experimental work of the course. The fitted heavy wooden box serves not only as a case for the outfit but also as a useful laboratory accessory for performing countless experiments.

## Easy Monthly Payments

You don't have to have even the small price of the course to start. You can pay for it in small monthly amounts—so small that you won't feel them. The cost of our course is very low, and includes everything, even the chemistry outfit—there are no extras to buy with our course. Our plan of monthly payments places a chemical education within the reach of everyone. Write us and let us explain our plan in full—give us the opportunity of showing you how you can qualify for a highly trained technical position without even giving up your present employment.

### Special 30 Day Offer

Besides furnishing the student with his Experimental Equipment, we are making an additional special offer for a short while only. You owe it to yourself to find out about it. Write today for full information and free book "Opportunities for Chemists." Send the coupon right now while it is fresh in your mind. Or just write your name and address on a postal and mail it to us. But whatever you do, act today before this offer is withdrawn.

DON'T WAIT—MAIL COUPON NOW!

**CHEMICAL INSTITUTE OF NEW YORK, Inc.**
Home Extension Division
66-X—WEST BROADWAY NEW YORK CITY

**CHEMICAL INSTITUTE OF NEW YORK**
Home Extension Division
66-X—West Broadway
New York City

Please send me at once, without any obligation on my part, your free Book "Opportunities for Chemists," and full particulars about the Experimental Equipment given to every student. Also please tell me about your plan of payment and your special 30 day offer.

NAME .....

ADDRESS .....

CITY..... STATE.....

S. I. Apr, '26


www.americanradiohistory.com

# Afraid *of* My Own Voice

## *But I Learned to Dominate - Others Almost Overnight*

SUDDENLY the boss turned to me and queried, "Well, Conroy, what's your opinion?" They all listened politely for me to speak and in the silence I heard my thin, wavering voice stammering and sputtering a few vague phrases. Like a flash Stoddard interrupted me and launched on a brilliant description of his plan. All set spellbound as he talked—my views were forgotton—and yet I have been studying the problem for months and I was prepared to suggest a sound, practical plan which I knew would solve all our difficulties.

And that was the way it always was—I was always being given opportunities to show my ability and always failing miserably. I was bashful, timid, and nervous—I never knew how to express myself, how to put my ideas across. In fact, I was actually afraid of my own voice! Constantly I saw others with less ability, less experience than I being promoted over my head—simply because they had the knack of forceful speech, self-confidence, and personality—the very qualities I lacked.

In social life, too, I was a total loss—I was always the "left-over"—the one who sat back and watched the others have a good time. I seemed doomed to be an all around failure unless I could conquer my timidity, my bashfulness, my lack of poise and inability to express myself.

### In 15 Minutes a Day

And then suddenly I discovered a new easy method which made me a powerful speaker almost overnight. I learned how to bend others to my will, how to dominate one man or an audience of thousands. Soon I had won salary increases, promotion, popularity, power. Today I always have a ready flow of speech at my command. I am able to rise to any occasion, to meet any emergency with just the right words. And I accomplished all this by developing the natural power of speech possessed by everyone, but cultivated by so few—by simply spending 15 minutes a day in the privacy of my own home to this most fascinating subject.

There is no magic, no trick, no mystery about becoming a powerful and convincing talker. You, too, can *conquer timidity*, stage fright, self-consciousness and bashfulness, winning advancement in salary, popularity, social standing and success. Today business demands for the big, important high-salaried jobs, men who can dominate others—men who can make others do as they wish. It is the power of forceful, convincing speech that causes one man to jump from obscurity to the presidency of a great corporation; another from a small, unimportant territory to a sales-manager's desk; another from the rank and file of political workers to a post of national importance; a timid, retiring, self-conscious man to change almost overnight into a popular and much applauded after-dinner speaker. Thousands have accomplished just such amazing things through this simple, easy, yet effective training.

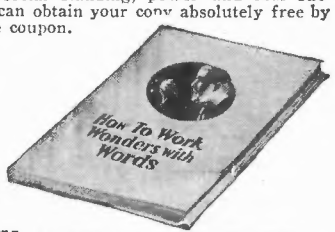
### What 15 Minutes a Day Will Show You

- How to talk before your club or lodge
- How to propose and respond to toasts
- How to address Board Meetings
- How to tell entertaining stories
- How to make a political speech
- How to make after-dinner speeches
- How to converse interestingly
- How to write letters
- How to sell more goods
- How to train your memory
- How to enlarge your vocabulary
- How to develop self-confidence
- How to acquire a winning personality
- How to strengthen your willpower and ambition
- How to become a clear, accurate thinker
- How to develop your power of concentration
- How to be the master of any situation.

### Send for this Amazing Book

This new method of training is fully described in a very interesting and informative booklet which is now being sent to everyone mailing the coupon below. This book is called, *How to Work Wonders With Words*. In it you are shown how to conquer stage fright, self-consciousness, timidity, bashfulness and fear—those things that keep you silent while men of lesser ability get what they want by the sheer power of convincing speech. Not only men who have made millions but thousands have sent for this book—and are unstinting in their praise of it. You are told how to bring out and develop your priceless "hidden knack"—the natural gift within you—which will win for you advancement in position and salary, popularity, social standing, power and real success. You can obtain your copy absolutely free by sending the coupon.

**Now Sent FREE**




**NORTH AMERICAN INSTITUTE**
**3601 Michigan Ave., Dept. 1384, Chicago, Ill.**

**NORTH AMERICAN INSTITUTE,**
**3601 Michigan Ave., Dept. 1384,**
**Chicago, Illinois**

Please send me FREE and without obligation my copy of your famous book, *How to Work Wonders With Words*.

Name .....

Address .....

City ..... State .....

www.americanradiohistory.com

Volume XIII
Whole No. 156

Science and Invention

April, 1926
No. 12

Editorial and General Offices, - - - 53 Park Place, New York

*"Those Who Refuse to Go Beyond Fact Rarely Get As Far As Fact" - - - HUXLEY*

# SUPERSTITION

## By HUGO GERNSBACK

ONE of the oldest and perhaps crassest of all human emotions is that described by the term of "superstition."

In this enlightened age it might be thought that this savage instinct—because that is all that it is—would have been entirely eradicated. But not so. I assert that superstition today is as great, or perhaps greater, than it was in the days of the Pharaohs and of the Caesars. In some cases, it is perhaps worse.

When we watch the savages go through their—to us so barbarous—performances, most of which are based upon superstition, we are moved, perhaps, to laughter or to pity, without stopping to think that many of us are as bad as, or worse, than the savages themselves.

There, is for instance, the *Taboo,* which, to the savage, means that a thing or object must not be touched under penalty of death. This is one of the most common of superstitions. To the savage it would probably appear equally ludicrous to see some of our enlightened citizens walking around a ladder instead of passing underneath it, or refraining from opening an umbrella indoors, or from sitting at a table with thirteen people, or yielding to many other equally foolish limitations imposed upon themselves by our so-called enlightened folk.

Most superstitions can probably be traced back to an instinct either inherited or experienced by ourselves. For instance, the fear of walking under a ladder was probably caused by a ladder falling upon some one, thereby hurting or even killing him. This information was then pandered about until people came to believe that it was actually harmful, or as we say, "unlucky," to walk under a ladder. We might as well be superstitious about walking in a street because a brick fell down at some time in the past and killed or hurt one or more of the passersby. The same logic is used in both cases.

By a curious coincidence, many great people have been affected by their various superstitions, and the greater they are the greater are their superstitions, and their stout belief in them. History, both ancient and modern, teaches that many of our greatest men were and are afflicted by this "disease", if so it may be called. A man sees a black cat walking in front of him perhaps twice during the entire course of his life, a thing purely accidental. Now perchance in these two cases something disagreeable happened to him, which, to be sure, would have happened without the passing of the black cat. But the belief becomes firmly rooted in his mind, that of course it is the cat that is to be blamed. Consequently, thereafter, if a black cat crosses his path, he knows that something unlucky *will* happen to him; whether immediately or six years later seems to make little difference in his warped logic.

While some assert that women are more superstitious than men, the male sex is just as deeply afflicted, and if the superstitions of the men are not so great in number they are as deeply rooted as in the fair sex. The woman being about the house a great deal naturally encounters more elements of the superstitious that abound in the house, as, for instance, the superstition of the broken mirror, salt spilled on the table, falling knives and forks, the cricket on the hearth, *ad lib, ad nauseum.* That these beliefs are deeply rooted in even the most modern and enlightened people is difficult to comprehend, but, unfortunately, it is true.

In enlightened America, thousands of men and women, the latter predominating, are flocking in ever-increasing number to Astrologers, Hindu Soothsayers, Gypsies, Palmists, Spiritualists, and many other fakers. The answer that you will usually get when asking one of these people why they pay out good money for such hokum is usually a laughing reply that they know that there is no foundation for the belief, and that it is done "just in fun." I personally have never been deluded by such talk, because people do not spend anywhere from 50c to $5.00 for one of these sittings "just for fun." Unconsciously, they do believe most of what is pandered about by these so-called "mystics", and as a rule swallow most of the findings, hook, line and sinker.

The careful investigator will always be surprised at the large number of people who believe in the ancient pseudo-science of Astrology. Before we knew anything of the movements of the planets and the stars, there perhaps was some excuse for such beliefs, but people today, just as well as those of old Egypt, still believe that it is lucky to be born on a certain day, with the stars or planets in a certain configuration; and what is more, they can usually find what they consider good proofs to back up their claims. But when they are made to understand that in each second of the day hundreds of different people are born whose destiny varies for each individual, no explanation is forthcoming. However, there is a sufficient number of people born on any single day to bring up the average figures on any common characteristics of their future that they wish to establish, if only you believe in this crass nonsense.

Palmistry, as practised by most fakers, is on the same level. I, for one, believe in palmistry just as I believe in physiognomy, or other character indications. I believe, for instance, that it is possible to tell certain things about characters, and occupation, by looking at one's hands. I need not be a palmist to identify the profession of the village smith from his hands, nor is it difficult to read the occupation of a violin virtuoso from his hands either. However, that is as far as I can conscientiously go. The faking palmist, though, insists that the lines of the hand will show your future and everything that will happen to you in the future. These things, of course, are utterly impossible and there are no authenticated cases on record, save a few coincidences. To be sure, once in a while a palmist will strike the bull's eye, by the simple "law of averages", but the hundreds and thousands that do not materialize are kept quiet and are not advertised.

In order to amuse the populace, one of the latest superstitions is to be found in the so-called "Numerology." This is the pseudo-science, wherein numbers are linked with the letters of your name, and, as is asserted by some of the exponents of this newest nonsense, if you are unlucky and if your career is not what it should be, the mere changing of your name, which, of course, results in the change of your numerals, will immediately spell "success" and "fame" for you.

As in all of the superstitions, there is a grain of truth concealed here somewhere. I can understand, for instance, that where a man has an unpronounceable name he will encounter a certain difficulty and resistance in getting on in life, but it can not count for a very great deal; because, after all, practically any family name that you can think of has some lucky or successful members, whose numerology is identical.

A great many of our superstitions are coupled with auto-suggestion and when everything is said, are in most cases harmless and do not hurt humanity as a whole, except to show us that we are still savages underneath our "modern civilization" veneer. In some cases it may even be said that some of our superstitions make us more careful and more cautious in some of our actions, so they may be considered as harmless in most cases.

Autosuggestion is a most powerful instrument of the mind. In many of our superstitions autosuggestion plays an important role. For instance, a young woman is told that she will marry a tall, dark-haired man. This makes a great impression upon her, and the chances are that when she meets a man of this type, who is at all acceptable she will be drawn strongly to him, and in many cases she will marry that type of man.

Of course she would not believe you if you were to tell her that it was autosuggestion that made her choose this mate, but she will be sure that her marriage was correctly predicted.

THE GOLDEN AGE OF SCIENCE

is symbolized by the golden cover OF SCIENCE & INVENTION, LOOK FOR THE GOLD COVER every month!

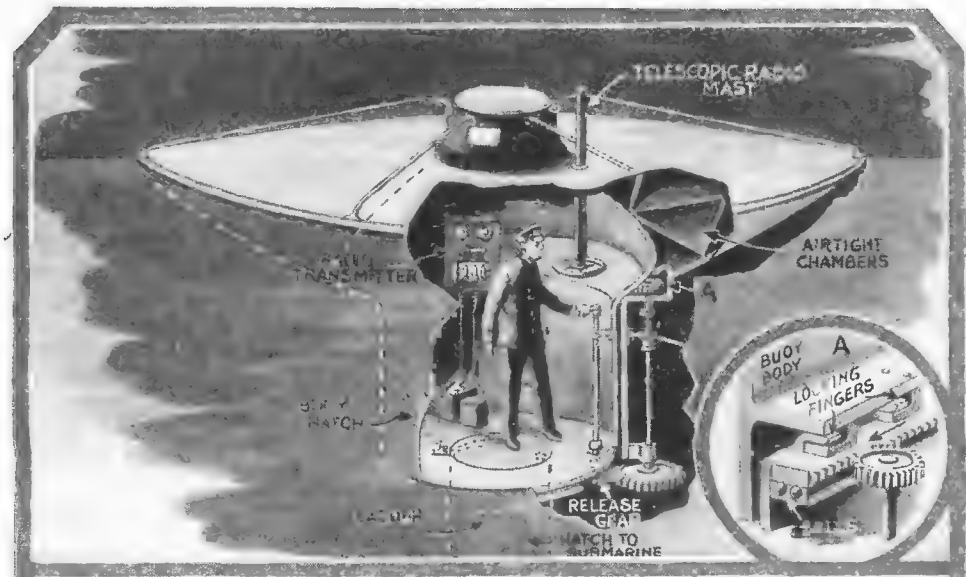
**Mr. Hugo Gernsback speaks every Monday at 9 P. M. from Station WRNY on various scientific and radio subjects.**



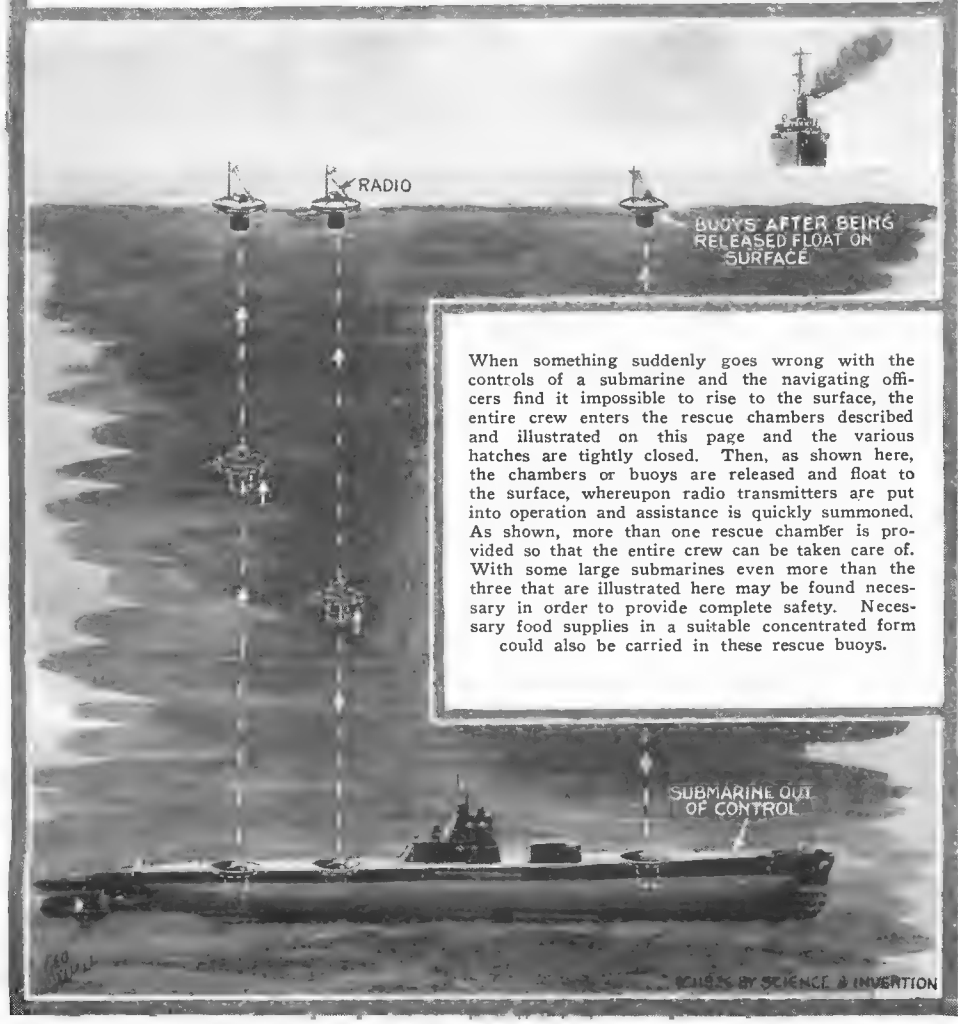
www.americanradiohistory.com

# Safety on Submarines

## Various Devices Described and Illustrated by Means of Which Submarinists Can Escape From Disabled Submerged Vessels




The device illustrated above is so designed and constructed that when fitted on the deck of a submarine it will not interfere with the maneouvering of that vessel in any way. It is firmly locked in place by means of the system shown in the insert A, and when part of the crew of a disabled submarine has entered it, a lever is turned and the escape chamber is released. The lever operates gears which in turn act on a rack and rotate the chamber slightly, thus unlocking the fingers illustrated and releasing the chamber so that it can readily rise. The mechanism is designed to operate on ball bearings so that even if a very tight fit is effected between the chamber and the submarine hull, still the release can be effected quickly and easily.




When something suddenly goes wrong with the controls of a submarine and the navigating officers find it impossible to rise to the surface, the entire crew enters the rescue chambers described and illustrated on this page and the various hatches are tightly closed. Then, as shown here, the chambers or buoys are released and float to the surface, whereupon radio transmitters are put into operation and assistance is quickly summoned. As shown, more than one rescue chamber is provided so that the entire crew can be taken care of. With some large submarines even more than the three that are illustrated here may be found necessary in order to provide complete safety. Necessary food supplies in a suitable concentrated form could also be carried in these rescue buoys.

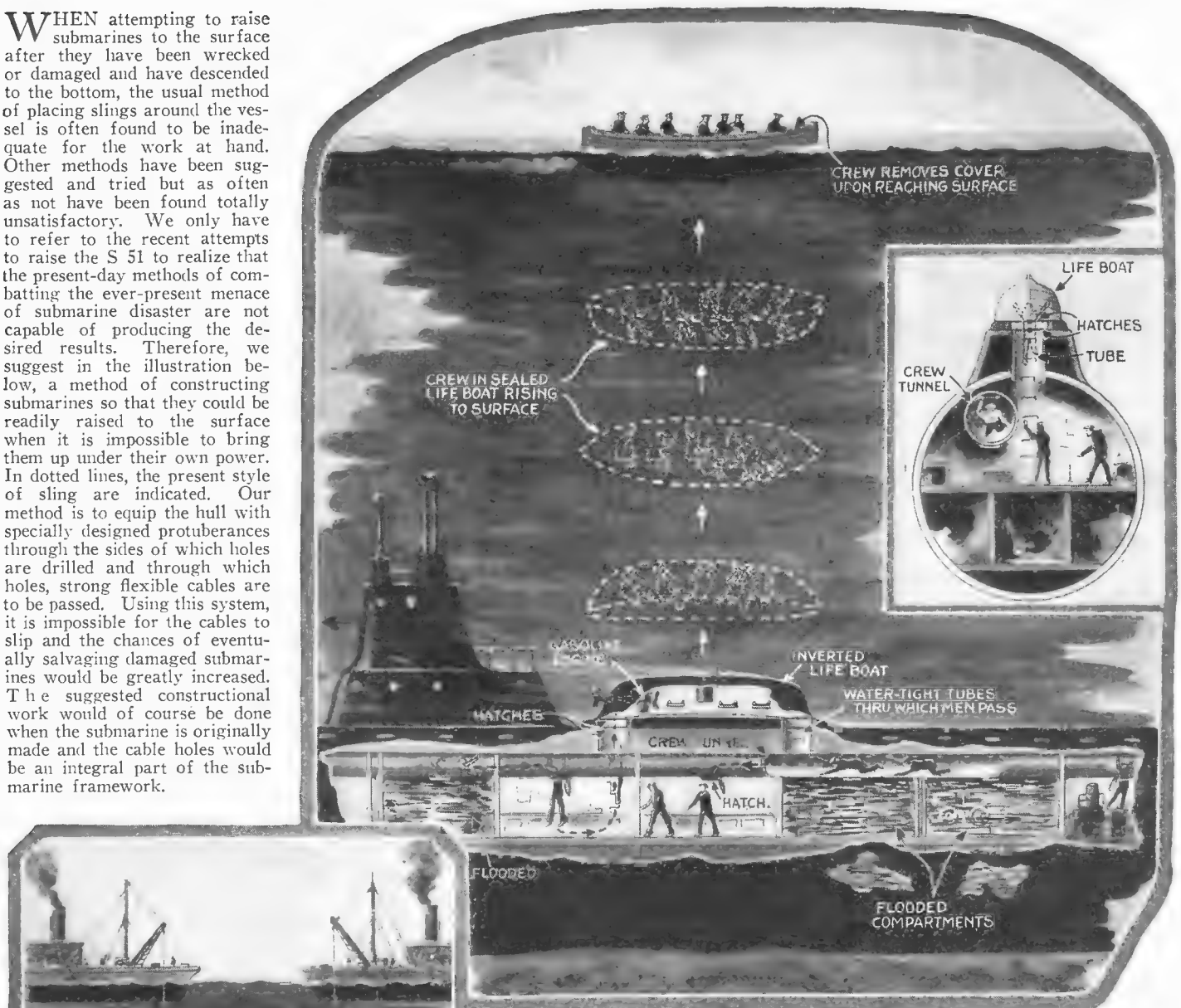
AT the left are shown complete details of a patented type of submarine escape device that has been very cleverly worked out by its inventor and in which practically every emergency is provided for. This chamber, which in itself is so constructed that it will float, is designed to be one of several located at strategic points on the deck of a submarine. The chamber is so constructed that when it is entered from below and the hatch is tightly closed, one of the men within it can manipulate certain levers and release the entire chamber from the submarine whereupon it will immediately rise to the surface. The principal details of the mechanical construction of this system are shown in the illustrations at the immediate left. This device was invented and patented by A. J. Griffin.—Patent No. 1,103,958.

Above: Another type of rescue device for submarines wherein the occupants do not actually escape but are provided with air and with means of radio communication by means of a float that is released and allowed to rise to the surface, carrying a flexible air tube and control wires for a small yet powerful radio transmitter built into the float. When the buoy reaches the surface, collapsible radio masts and air intake funnels can be erected and the navigators of the submarine can summon assistance.
—Lyman Mason.

www.americanradiohistory.com

# Due to Several Recent Submarine Disasters, These Rescue Methods Should Be of Timely Interest

WHEN attempting to raise submarines to the surface after they have been wrecked or damaged and have descended to the bottom, the usual method of placing slings around the vessel is often found to be inadequate for the work at hand. Other methods have been suggested and tried but as often as not have been found totally unsatisfactory. We only have to refer to the recent attempts to raise the S 51 to realize that the present-day methods of combatting the ever-present menace of submarine disaster are not capable of producing the desired results. Therefore, we suggest in the illustration below, a method of constructing submarines so that they could be readily raised to the surface when it is impossible to bring them up under their own power. In dotted lines, the present style of sling are indicated. Our method is to equip the hull with specially designed protuberances through the sides of which holes are drilled and through which holes, strong flexible cables are to be passed. Using this system, it is impossible for the cables to slip and the chances of eventually salvaging damaged submarines would be greatly increased. The suggested constructional work would of course be done when the submarine is originally made and the cable holes would be an integral part of the submarine framework.




ANOTHER inventor, E. R. Kimball, has advanced the theory of submarine rescue illustrated in detail above. Mr. Kimball's idea covers two important phases of the subject. First, he would connect all of the separate watertight compartments of the submarine by means of a tunnel of sufficient size to allow a man to crawl through. In each compartment there would be a watertight entrance into this tunnel which would be kept locked at all times except when it was to be used as an emergency exit. The second part of the scheme is to place at intervals along the deck of the submarine, inverted boats with sealed covers and with watertight tubes communicating with different compartments of the submarine and with the inverted life boat. In time of an emergency, let us assume that, as illustrated above, three of the submarine compartments are flooded. Those of the crew who are alive and are stationed in the other compartments would immediately pass into the communicating tunnel and proceed into one of the compartments with which one of the tubes to the life boat communicates. They would then pass up through the tubes into the life boat and when all were assembled, they would close the hatches and release the life boat from the surface of the submarine. The inverted boat would then be released from the deck of the submarine whereupon it would immediately start to rise to the surface and by the crew shifting their weights as shown, the boat would be in an upright position when it arrived at the surface. Then, of course, the watertight cover would be immediately removed, the gasoline engine would be started and the crew would proceed in their life boat to find assistance.

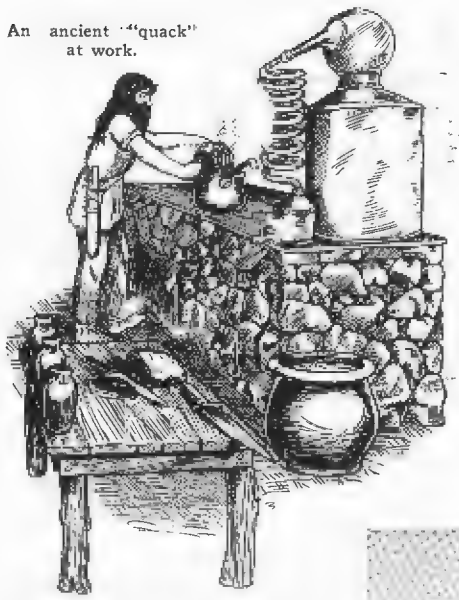
There are many other refinements possible for this idea than those that we have shown in our simplified diagram. For instance, provision could be made for forcing water out of flooded portions of the tunnel and out of flooded life boats in case such an emergency should arise. Of course, more than one life boat could be placed on each submarine and in this case the chances for rescue increase.

www.americanradiohistory.com

# MEDICAL FRAUDS

By JOSEPH H. KRAUS

## Beware of the Cures Claimed Here. They Are Fraudulent



An ancient "quack" at work.

How a popular and expensive "medicine" used by the old Egyptians was imitated by treating meat with melted pitch.

Signs in drug store windows are often very deceptive. Be guided only by the claims made on the packages containing medicines, as such statements are under government control.

THROUGHOUT all ages of the world people have suffered from diseases, imaginary or real, and they have usually recovered, either spontaneously or with the aid of proper remedies. It is not always possible to decide in any given case whether the natural power of recovery which the body possesses has brought about a cure, or whether the treatment alone, or whether both together have been effective. But in most cases the influence of the imagination and belief is easily seen. Every physician of experience has had cases in which his treatment has benefited his patients much more than he had reason to expect. On the other hand, a patient may suffer for many years and receive treatment from the best doctors in vain, and then suddenly recover after using some patent medicine, which he then recommends to all of his friends. The little pink pills he has been using then become a panacea.

### GOVERNMENT CHECK ON FRAUDS

Eventually, however, the Government chemist or the medical societies analyze the pills, only to find that they contain a little sugar and some pink coloring matter, together with a small amount of purgative drug. The pink pill cannot possibly do what is claimed for it, and the preparation is removed from the market.

The statements just made no doubt sound absurd, but our treatment of various ailments today is far less peculiar than the treatment employed when the United States were first founded. As a matter of fact, I have in my possession a book bearing the copyright date of 1900, which describes the treatment of warts in the following terms: "When there is a full moon in the sky, go to a graveyard and find a hollow trunk of an oak tree, or the hollow stump of an oak tree, in which a small quantity of rain from a previous downpour has remained. Dip the hand in the water in the stump of the tree, then walk around the tree stump three times, being sure that you walk to the left. When your own shadow crosses the hollow in the stump, after you have walked around the tree stump three times, dip your hand in the water again. Then go home, but do not speak a single word to anyone until the following morning. If one treatment does not cure, another attempt should be made."

The vender of rattlesnake oil is a rare sight today, but it was not so many years ago that he did a thriving business in even the large communities. The oil is still sold by an occasional medicine man, but his numbers are few, and steadily decreasing.

### DECEPTIVE CLAIMS OF CURES

Such a method of treatment is as absurd as it is worthless, but a drowning man grasps at a straw, and most of us, when we are ill, try those cures which others claim they have found to be so wonderful. Not infrequently, testimonials of cures which have been effected, when carefully checked up, will be found to be inaccurate. In many cases, the sufferer will have died of the very disease which his testimonial indicates was cured by one or the other of the various preparations.

Fully two thousand, five hundred years ago there were *faith healers* that were making the same pretenses that Emile Coué is making today with his "getting better and better every day." Is there any hope that mankind will ever be any different?

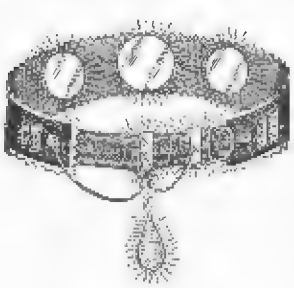
### VARIOUS REMEDIES

There are, of course, some but not a great many, substances that are absolute remedies. Quinine, known for three hundred years, is a specific for malaria. Mercury is seven hundred years old, and arsenic two thousand, five hundred years old; both are agents of known value. There are a great many others which help, even if they do not cure.

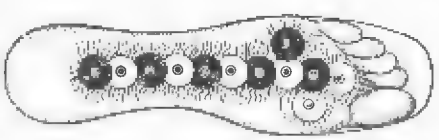
### ANCIENT MEDICINES

Let us for a moment drop back into the olden times when medicine was not as far advaned as it is today. Some four thousand years ago, the Egyptians had a whole series of what they thought to be remedies for nearly every disease that flesh was heir to. There were more than seven hundred drugs employed in Egypt. Not a single one which the Egyptians employed is now in use, but the Egyptians were deceived, as we are being deceived today into believing that each and every one of the drugs was capable of bringing diseased individuals back to health. During the Crusades, preserved portions of the bodies of old Egyptians were considered to be powerful medicines, and "mummy" was frequently prescribed as a cure-all for any disease. "Mummy" was expensive, so "patent medicine sharks" in those days, if they may be called that, took ordinary meat and impregnated the meat with pitch. Then they palmed this off as the genuine article. Testimonials declared this remedy to be marvelous. Then there was another substance called "Usnea" in pharmaceutical language. This was moss which was scraped from the skulls of persons

(*Continued on page* 1144)

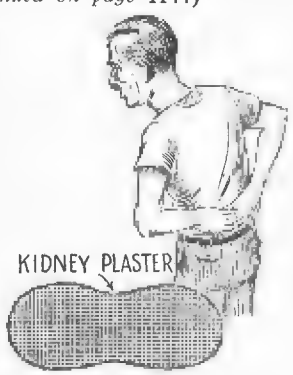


Did you ever wear an "electric belt" such as illustrated at the left, in hopes of curing a disease? If so, you undoubtedly found that it gave no relief and was a fake.



So-called electric insoles for shoes are illustrated above. They contain disks of dissimilar metals but there is no beneficial electrical action that takes place in them.

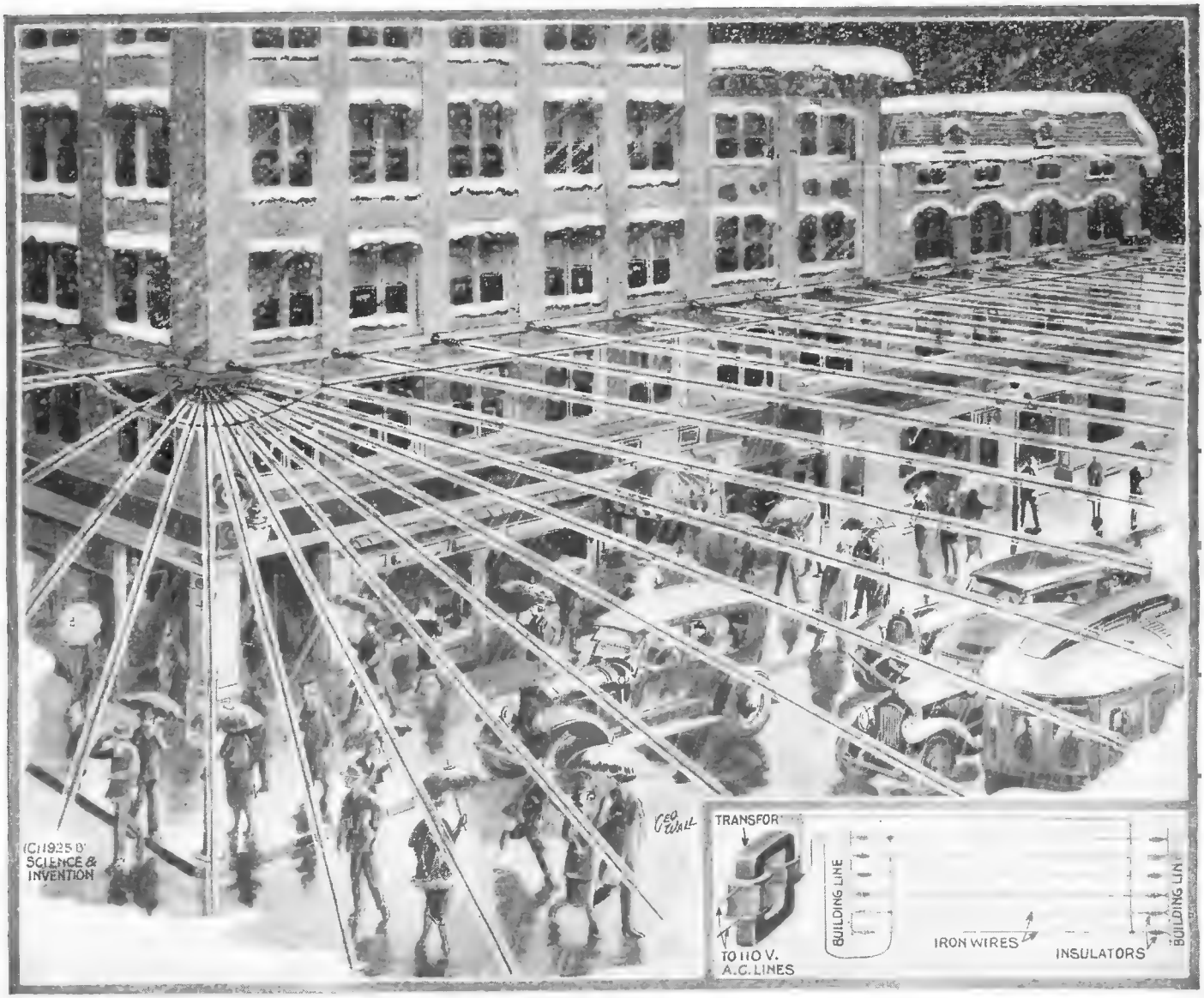
Kidney plasters and liver pads, designed to relieve all ailments of the back and cure many diseases are useless. Money spent in purchasing them is money thrown away. Usually the pains that are so treated are merely of muscular origin, and not of the kidneys.




www.americanradiohistory.com

# Electric Snow Eliminator

By J. KAY LONDON




Above is shown an artist's conception of how the proposed electric snow eliminator would work. The system consists of a fanlike arrangement of wires stretched across the streets and thoroughfare. The wires are preferably made of iron or some other electrically resistant material, which will develop heat when current is passed through it. As a safety precaution current at low pressure is used, so that should a wire break, there will be little danger to pedestrians, even though the current were not turned off immediately after the break. The small insert shows the circuit to be employed.

WHEN winter comes and the snow lays heavy on the ground great sums of money are lost because of traffic tie-ups and many tons of perishable merchandise go to waste. This condition affects the greater cities more vitally, than it does the outlying districts, because the latter generally provide within their homes for weather conditions, whereas the former are dependent on a daily purchase of commodities for their welfare. For this reason the large cities go to a great expense in removing snow as rapidly as it is possible, but even the highly efficient departments in these cities could not cope with a situation similar to the snowfall in New York City in 1888, when the snow was banked more than ten feet high in many places. Naturally such a snowfall closes all shops and interferes with the use of elevated trains and street cars, as well as other means of surface transportation.

If, however, we had all the main thoroughfares wired with a net-work of iron wires located approximately twenty feet above the street level, and if these wires were connected to sources of current supply at as low a potential as twenty volts, it would be possible to heat the wires sufficiently to melt any snow falling upon or near them.

Such a system is illustrated above and the diagram is likewise given. It will be seen that the device could easily prove satisfactory. The falling snow reaching the vicinity of the wires stretched across the streets is melted by the hot wires and falls in the form of raindrops to the sidewalk below. Now unless the outside temperature is exceptionally low, this partially warmed water will melt any snow which should happen to fall through the wires outside of the heated area. Thus the walks and thoroughfares are kept clear of snow and pedestrians use their umbrellas as they would on any rainy day. Such a system would likewise keep the streets a little warmer than they are on some of the wintry days.

The installation itself would not be very expensive. Insulators would have to be attached to the walls of buildings about twenty feet above the street level and iron wires would then have to be stretched from one side of the street to the other. Iron wires, of course, are quite cheap, but any other resistant material might be used in place of the iron wires. These wires are then connected together at one end with a bare copper wire, and this lead terminates at one of the poles of a step-down transformer. The other output side of the step-down transformer connects with the iron wires near the buildings on the opposite side of the street.

The question of current supply is now important. In those cities where hydro-electric power development has been organized by either the city itself or by some large company, the electric power supply is quite cheap and the cost of operating such an installation would be very low. In fact the expense for operating a system of this nature would be cheaper than attempting to remove the snow by any of the snow removal methods which we now employ.

It remains to be seen whether this method would cope with very heavy snowfalls when the surrounding temperature is considerably below freezing. It might even be advisable to place ordinary switches in the circuit so that when the outside temperature falls to let us say ten degrees below freezing, the device would be shut off and in this way slippery streets would be prevented. Should one or more of the wires break, the possibility is that the cooling effect of the air would prevent a burn if the wire dropped upon the pedestrian. At a potential of twenty volts, accidental electrocution would be impossible.

www.americanradiohistory.com

# "Antinoe" Sinking Cabled Across the Atlantic

By H. WINFIELD SECOR, E. E.

At the left appears a picture of the foundering "Antinoe" as cabled from London to New York over the regular cable system. As shown on the right hand page the perforated tape containing the proper sequence of signals was made in London from the original snapshot of the "Antinoe." As the enlargement in the small circle shows, every part of the picture is composed of square dots similar to those of a half tone. These dots are of varying degrees of light and shade, and owing to their small size a faithful picture is built up as becomes evident by viewing the accompanying reproduction at arm's length.

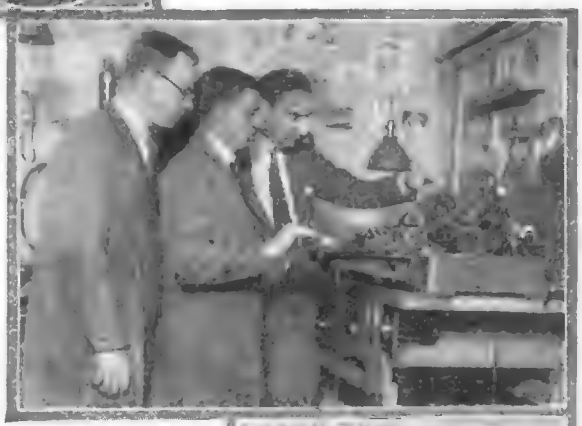
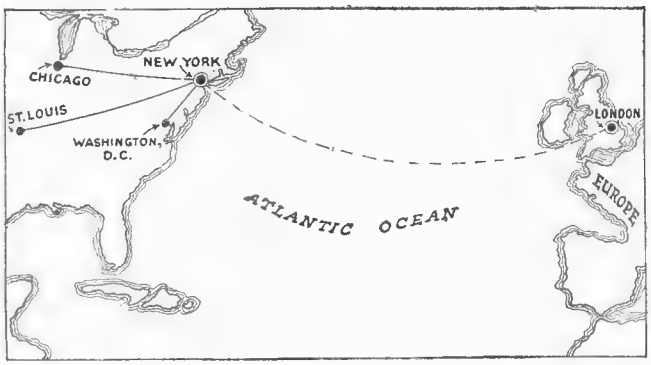
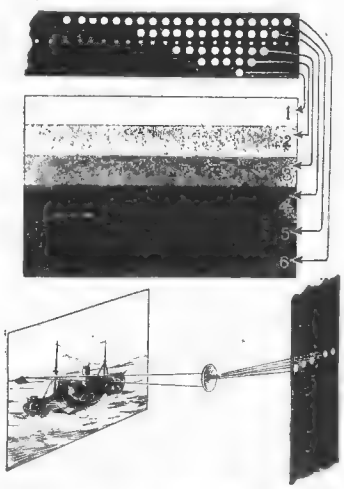


Photo at right shows machine for reproducing photo as well as preparing transmission tape in New York office of photo syndicate service. Man in center is Captain M. D. McFarlane, who in collaboration with H. G. Bartholomew of the "London Daily Mirror," evolved the Bartlane system of transmitting photos by radio or cable. The pictures may also be transmitted over telegraph lines if desired. The man at the extreme left of the picture is C. F. Willis, Bartlane expert, and man at right is F. S. Millar of the Western Union Cable Company. The photo shows first picture being received from London, September, 1925.




Map at left shows present facilities in actual operation for transmitting pictures such as "Antinoe" across ocean and to all parts of U. S.

The diagram at the immediate right shows the tone scheme employed in this process. It should be remembered to begin with, that no special cable transmitting or receiving apparatus is necessary. The snapshot received in London by airplane from the S. S. "President Roosevelt," was hurried into the Laboratory, and five prints on zinc were made from the negative, each of a different exposure, giving the five principal tones of light and shadow. There are really six tones obtained in the complete process, as the diagram at right shows. The five prints on zinc leave certain parts of metal exposed and an electric circuit is established through these portions, corresponding to lights and shadows, each registering on certain perforators as shown on opposite page. The cable company receives the perforated tape, transmits its readings across the ocean, the new tape being delivered to the New York laboratory, and reproduced as a picture in the manner shown. A marvelous concentrating lens combines the light rays in the reproducer to make square dots of varying tone values.




Above we see the smiling face of New York City's new mayor the Honorable James J. Walker, as reproduced in London papers from a picture cabled across the Atlantic from New York. Did you notice the art border around this page? It is composed of five feet of the perforated paper tape, a small part of the two hundred and seventy feet of tape required to transmit Mayor Walker's picture across the Atlantic.

The tape forming the border of this page and comprising a part of Mayor Walker's photo shown above, is just one-half the width of the actual tape used. It takes a relatively short time to prepare the five tone negatives from the original picture in the transmission laboratory, and the tape signals for photo are transmitted across the ocean in a few minutes. Once the tape is placed in the reproducing machine it requires but one and one-fourth minutes to record the picture on the film, develop and fix it, and obtain a print from the wet negative.

www.americanradiohistory.com

# How Photos Are Cabled Across Atlantic

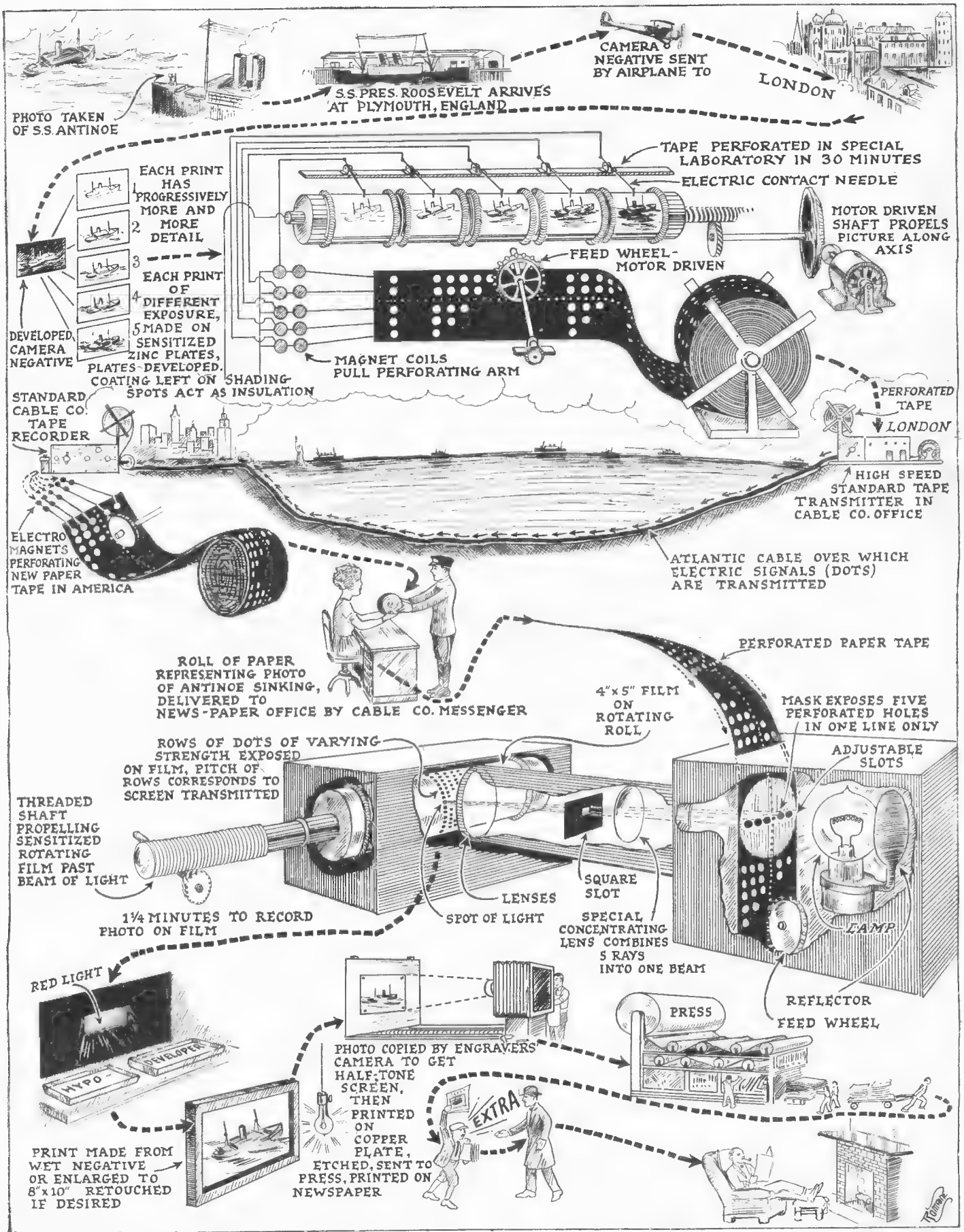


PHOTO TAKEN OF S.S. ANTINOE
S.S. PRES. ROOSEVELT ARRIVES AT PLYMOUTH, ENGLAND
CAMERA & NEGATIVE SENT BY AIRPLANE TO
LONDON
EACH PRINT HAS PROGRESSIVELY MORE AND MORE DETAIL
EACH PRINT OF DIFFERENT EXPOSURE, MADE ON SENSITIZED ZINC PLATES, PLATES DEVELOPED, COATING LEFT ON SHADING SPOTS ACT AS INSULATION
DEVELOPED CAMERA NEGATIVE
TAPE PERFORATED IN SPECIAL LABORATORY IN 30 MINUTES
ELECTRIC CONTACT NEEDLE
MOTOR DRIVEN SHAFT PROPELS PICTURE ALONG AXIS
FEED WHEEL-MOTOR DRIVEN
MAGNET COILS PULL PERFORATING ARM
STANDARD CABLE CO. TAPE RECORDER
PERFORATED TAPE
LONDON
HIGH SPEED STANDARD TAPE TRANSMITTER IN CABLE CO. OFFICE
ELECTRO MAGNETS PERFORATING NEW PAPER TAPE IN AMERICA
ATLANTIC CABLE OVER WHICH ELECTRIC SIGNALS (DOTS) ARE TRANSMITTED
ROLL OF PAPER REPRESENTING PHOTO OF ANTINOE SINKING, DELIVERED TO NEWS-PAPER OFFICE BY CABLE CO. MESSENGER
PERFORATED PAPER TAPE
4"x5" FILM ON ROTATING ROLL
MASK EXPOSES FIVE PERFORATED HOLES IN ONE LINE ONLY
ADJUSTABLE SLOTS
ROWS OF DOTS OF VARYING STRENGTH EXPOSED ON FILM, PITCH OF ROWS CORRESPONDS TO SCREEN TRANSMITTED
THREADED SHAFT PROPELLING SENSITIZED ROTATING FILM PAST BEAM OF LIGHT
1¼ MINUTES TO RECORD PHOTO ON FILM
LENSES
SPOT OF LIGHT
SQUARE SLOT
SPECIAL CONCENTRATING LENS COMBINES 5 RAYS INTO ONE BEAM
LAMP
REFLECTOR
FEED WHEEL
RED LIGHT
DEVELOPER
HYPO
PRINT MADE FROM WET NEGATIVE OR ENLARGED TO 8"x10" RETOUCHED IF DESIRED
PHOTO COPIED BY ENGRAVERS CAMERA TO GET HALF-TONE SCREEN, THEN PRINTED ON COPPER PLATE, ETCHED, SENT TO PRESS, PRINTED ON NEWSPAPER
PRESS
EXTRA

When the crew of the S. S. "President Roosevelt" was rescuing those on board the S.S. "Antinoe," a photograph was taken of the latter vessel. This photograph was subsequently sent by cable to the United States for publication. The above illustrations shows the various steps in the transmission. Five prints were made from the negative on zinc sheets. These were then developed and by the process used, the shaded parts were insulated from the metal and the light parts were not, Then, as contact needles were passed over the surfaces as shown, circuits were made and broken and the tape was perforated. These perforations were transmitted in the usual manner, received and recorded. The recorded tape was then photographically impressed on a sensitized film in the special manner illustrated. From then on, the process is plain.

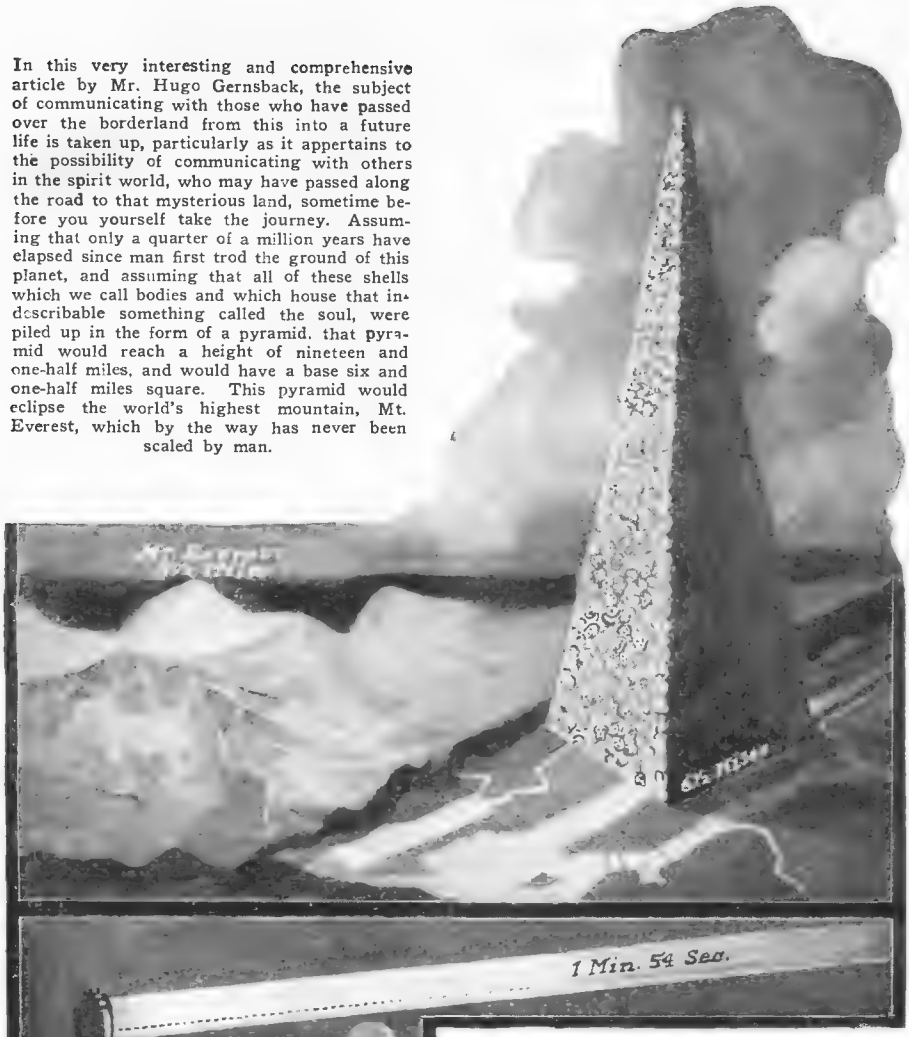
www.americanradiohistory.com

# Can the Dead...

## By HUGO

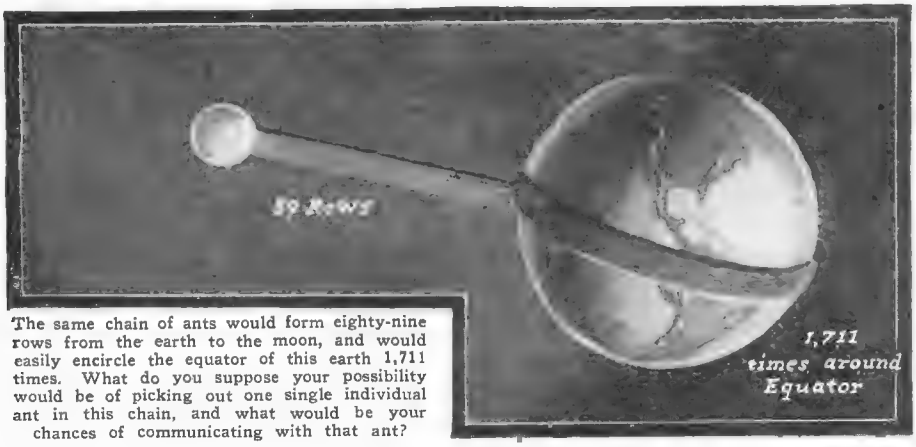
*Member American*

In this very interesting and comprehensive article by Mr. Hugo Gernsback, the subject of communicating with those who have passed over the borderland from this into a future life is taken up, particularly as it appertains to the possibility of communicating with others in the spirit world, who may have passed along the road to that mysterious land, sometime before you yourself take the journey. Assuming that only a quarter of a million years have elapsed since man first trod the ground of this planet, and assuming that all of these shells which we call bodies and which house that indescribable something called the soul, were piled up in the form of a pyramid, that pyramid would reach a height of nineteen and one-half miles, and would have a base six and one-half miles square. This pyramid would eclipse the world's highest mountain, Mt. Everest, which by the way has never been scaled by man.




Let us assume that the souls of men are only as large as an ant, one-eighth of an inch long, and that these are placed end to end. This chain of ants would reach out into space for a distance of 21,390,769½ miles. It would take a beam of light one minute and fifty-four seconds to reach the end of the chain.

The question of the possibility of communicating with a spirit, while you yourself are in the spirit world, is taken up in the accompanying article from a purely scientific viewpoint. No attempt is made to dispute religious beliefs and there is no desire to attack any religious doctrine or teaching. The queston of the hereafter is not discussed and is accepted on its face value. The main subject under discussion is the possibility of communicating with some single individual in the spirit world. The particular form of communication is also not given in this particular article. It is assumed that communication may take place in any of a variety of ways known and unknown to us today. The questions are looked upon purely from the standpoint of chance possibilities and your chances of effecting those communications have been calculated the same as Hoyle calculates your chances of getting a straight or a royal flush in a game of cards. If the doctor told you that you had one chance in ten trillion of living another twenty-four hours, the outlook would be quite hopeless. Well, you have less chance than that of communicating with a departed spirit!




The same chain of ants would form eighty-nine rows from the earth to the moon, and would easily encircle the equator of this earth 1,711 times. What do you suppose your possibility would be of picking out one single individual ant in this chain, and what would be your chances of communicating with that ant?

BEFORE I go further, I wish to make it plain here that nowhere in this article do I attack any religious belief, or take issue with any religious doctrines. I wish to show here merely my own impressions on the subject, approaching the problem from a scientific and mathematical viewpoint. I believe that whatever new ideas can be brought forward in an all-absorbing topic of this kind should be welcomed by all.

I shall not question the hereafter nor discuss the question of the existence of the soul in any way; but I do believe that consideration of certain angles of the subject will do no one harm, and perhaps give rise to some interesting discussion of this problem.

As far as science knows, the human race has been on this planet some 500,000 years or more. When I say "human race" I do so advisedly. For instance, the human being who existed 500,000 years ago is known to science as Pithecanthropus Erectus. This first, so-called "ape man," of Java, gives science its first idea of what our remote ancestors were. If he was a being who could speak, orally, he must be called a human being. But we need not look back quite so far; and for the purposes of this discussion I shall go back for only 250,000 years; at which period we are certain that there were human beings on this planet imbued with a fair degree of intelligence, and possessed of what we are pleased to term today "soul". This is in contradistinction to our closest relation, the ape, who, in popular belief, is thought of as not being possessed of a soul.

It is upon this platform that the present arguments are being reared. It can be shown that for 250,000 years or more the population of the earth has not varied very greatly. While, perhaps, the population at that time was not 1,748,000,000,—which is the population of the world today,—it probably was well over 1,000,000,000 (one billion) for the following reasons:

It is well known that the fecundity of aborigines was much greater than that of civilized man. For instance, at present it is to be doubted that the average family has more than three or four offspring. Hundreds and thousands of years ago this was not the case, the number of children being very much greater.

It is also true that even as recently as 2,000 years ago, people did not live as long as they do now, and died comparatively young. Diseases had not been conquered, and people died like flies, due to plagues and infantile diseases, as recorded in history. Counteracting this, there were many more births than there are today. Modern man, who is beginning to conquer diseases, does not have as many children as were customary at that time; so while it would seem that we should have a vastly larger population today, it remains fairly constant. In China and India, even today, there are still a great many more births than in the western civilizations; but these are immediately offset by devastating diseases, famines, etc., which kill off so many more people. The balance is therefore adjusted very nicely by Nature.

Careful computation shows that the yearly deaths for the entire planet take 43,369,813 lives out of the 1,748,000,000 inhabitants. If we take this yearly figure and base our calculations upon 250,000 years, as already mentioned, we shall get the figure of 10,842,553,250,000. This is a tremendous number, far greater than is possible for

www.americanradiohistory.com

# Be Re-United?

**GERNSBACK, F.R.S.**

*Physical Society*

the human mind to comprehend. The figure, nevertheless, must be fairly approximate, but even if it should vary from the exact number by a few billions this would make very little difference for the purposes of this discussion.

We are now confronted by the fact that if, during the past quarter of a million years, ten trillions of souls have passed into the Great Beyond, these ten trillions must still be floating around somewhere in space, if there is such a thing as a Hereafter.

Life insurance figures, carefully calculated, show us that the difference between the "expectancies" of man and woman averages a little more than two and a half years. By this we mean that the average chances are that when you die, your wife, if of the same age, will die two and a half years later. These, of course, are only average figures.

Let us now take an average case: Tom Jones, a man of very religious nature, believing in the soul and the Hereafter, dies today. His spirit, according to his belief, will therefore pass immediately into the Great Beyond. In all probability, his beloved wife, whom he sincerely hopes and prays to meet in the Beyond, will follow him not much less than two and a half years later. The problem then becomes *"What are the chances that she will meet him in the Hereafter and again be united with him?"* If we assume that Tom Jones, after he passes into the Great Beyond, retains his perceptive and reasoning powers and can remove himself to any point on this globe, the discussion must stop right here; because the probability then would be that he would certainly be near the locality where his wife lived but recently, and the minute she died and passed into the Hereafter, he would meet her instantly. That, of course, would end the problem to the satisfaction of every one. There would then be no discussion.

But let us go a little further. Some ecclesiastical writers and theologians believe that the soul has some shape, and for that reason must assume some dimension. Whether these dimensions are absolutely fixed or not need not enter into this discussion at all; but with ten trillion souls abounding somewhere above the planet, it must be assumed that there would be practically no standing room,—if we may use such an irreverent term,—for any of the souls.

While the earth is inhabited to a great extent, yet there are still not so many places where people actually live. There are, of course, isolated farms, and mountain tops, where the number of people who have actually died has not been very great. But take any of our crowded regions, as, for instance, in Europe; and if you go back for some 250,000 years it will be found that there is not one spot, that has not been at various times inhabited by thousands upon thousands of people, who have long since died. Do their souls stay in any particular spot, or do they roam around, after reuniting, or not?

A "royal flush" comes once in 649,739 times (Hoyle). Your chances of getting one are 16,686,166 times better than your chance of communicating with a single soul.

Somewhere in the Atlantic Ocean a ship is sailing the high seas. Someone on board that ship throws a bottle into the ocean. Anywhere else in the world a person goes down to the shore to look for that bottle. What do you suppose your chances of finding that bottle would be? Remember it does not make any difference where the ship was or where you were when you looked for the bottle which measures 4 5/16" in diameter.

This question should not trouble us a great deal, because it can be answered to the satisfaction of all by any one who has religious beliefs. But I wish to point out here that it can not be denied that there must be a great deal of crowding in the Beyond, unless the reunited ones float on to the outer space, never to return. This, of course, would make it much simpler for those who also pass away, if we assume such a condition. It would seem more rational, however, that, having passed from this life, the departed souls would stay or hover around the planet.

If we assume this, we immediately become conscious that somewhere around the planet there are continually floating some ten trillion souls.

If the departed ones mingle with those who have already gone into the Great Beyond, what are the chances of the ones who die two or more years later to be reunited with their beloved ones? Again I shall be told at this juncture that souls, by means not known to us, are able to communicate with each other instantaneously, no matter where they are. If we ascribe this supernatural power to the departed souls we have no problem; because if even one lone soul arriving among ten trillion others scattered anywhere in space, were endowed with telepathic powers, the reunion would be very prompt. But of course we are not positive that the departed ones have such power; and without wishing again to deny this, let us assume that they have no such power. What, then, are the chances of one soul finding another one?

This becomes a simple problem of mathematics, and may be stated as follows: In a poker game, a royal flush comes once in 649,739 times, according to Hoyle. Your chances of getting a royal flush, are 16,686,166 times better than your chances of communicating with a particular soul.

If the departed soul has any dimensions, it may be as big as a planet or bigger, or as small as an electron, or smaller. If it had the size of an ant, or, let us say, was one-eighth of an inch long, and if all the ten trillions of souls were placed end to end, this distance would be 112,943,263,020 feet, or 21,390,769½ miles, almost 90 times the distance from the earth to the moon, or about 1,711 times around the Earth's equator.

(*Continued on page* 1151)

Now we see a man down at the shore looking for a bottle which may have been thrown overboard off the coast of Africa. This man approaches the nearest shore line to his home, and with a pair of spy glasses which restrict his vision to a circle 4 5/16" in diameter, he looks in eleven places and has just as much chance of finding it as he has of communicating with a spirit.

A needle is concealed in the haystack here shown 900 feet high. Do you suppose that you would be able to find a 2½-inch needle in this pile of hay? If not, do not expect to be able to communicate with a departed spirit.

www.americanradiohistory.com

# Electro-Chemistry Restores Ancient Bronzes

## Crumbling Statues From Ruins Of Bygone Centuries Can Now Be Restored To Their Original Grandeur

Above: Corroded statue before it was treated to restore it to its original appearance and form.

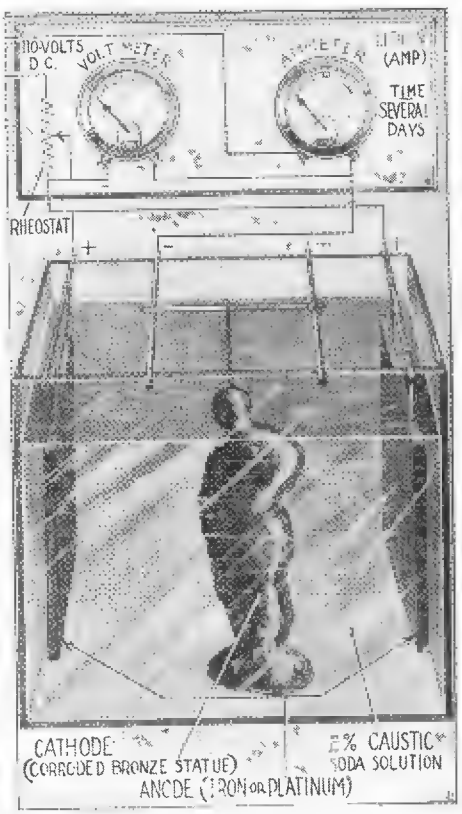
On the bronze plate shown at the left above, it is almost impossible to see any of the hieroglyphics. However, after it has been restored, as shown on the right, by the electrolysis method, practically all of the inscriptions are visible and can easily be deciphered.

Above: A fully restored bronze statue reclaimed by the electro-chemical method described here.

THE cleaning, repair and restoration of ancient art objects has always been a most interesting subject, but up to the present time the methods that have been followed have been rather haphazard and as often as not have resulted in failure or complete destruction of valuable material. It is obvious, upon consideration of the subject that a good method of restoring bronze objects will be of great interest to antiquarians and museum directors throughout the world, inasmuch as not only statues and other bronzes that have been found in excavations in ancient cities have suffered, but more modern bronze objects are often badly corroded due to exposure to the atmosphere and the elements. The application of acid and other similar corrosive agents to such works of art often is disastrous in results. Mechanical methods of removing incrustations are so crude that parts of the objects are frequently damaged beyond repair.

A study of this subject has been undertaken by Prof. Colin G. Fink and Charles H. Eldridge of Columbia University and the results of their findings have been published in a pamphlet issued by the Metropolitan Museum of Art, in New York City. In essence, the new method that has been discovered utilizes reverse electrolysis. It has been found that in practically all cases, the corrosion on the surface of metal objects is a metallic salt and by an electrolytic method, these salts have been reduced to give their original basic element, that is the metal, and as a result it has been possible to restore corroded metal objects to their original contours, even in the original metal. It has been found that the details of design or workmanship have been preserved and followed exactly by the layer of metallic oxides covering the objects. Over this is usually found a crust formed by electrolytic decomposition and by reversing the process of electrolysis, this crust can be removed, and the oxide reduced to metal.

By following the method described below, it has been found possible, not only to restore partially corroded metallic objects but also to bring those back to their original form that have been wholly oxidized. In other words, even though there is no metal present, the oxide can be changed so as to present the original form. The first step in this process is to hang the bronze object in a 2% caustic soda solution as the cathode of an electrolytic couple, and pass a low amperage direct current through the solution. Two anodes are used, iron duriron or platinum, and they are hung on opposite sides of the object. For small parts 0.1 to 0.5 amperes are employed By the action of the electrolysis, the crust is reduced to spongy copper. The object is then removed from the solution and carefully washed in warm water. If now there is a metallic base to the object, the reduced spongy copper layer may be removed by gentle brushing. If, however, there is no metallic core, the object is dipped into a solution of 1 part of nitric acid to 4 parts of water, and into water alternately over and over again, until the reduced outer layer of copper is dissolved. Soon the hard copper oxide surface in which is found the detail of the design is exposed and this surface is found to be almost as hard and smooth to the touch as was the original metallic surface of the bronze itself.




This diagram shows the details of the electro-chemical method employed in restoring ancient bronzes of various types.

The various photographs shown on this page illustrate the wonderful results that can be obtained by expert manipulation of the process described above. For instance, note the bronze plate in the illustration at the top center of this page. When originally discovered, this relic was practically valueless because the inscriptions upon it could not be deciphered. When restored by electro-chemistry, there was no trouble whatsoever in determining the exact history of the antique plate.

Another example of a restored bronze art object is shown in the above photographs. At the left, the destructive corrosion can readily be seen. No details can be discerned. At the right, the photograph shows the same statue after restoration showing the complete detail that has become visible throughout the entire structure. —*Photos Metropolitan Museum of Art.*

www.americanradiohistory.com

# New Steel Resists Great Heat

## Oxy-Acetylene Torches Fail To Affect Donsteel

IN a recent demonstration of a new alloy steel christened donsteel, in honor of its inventor, J. G. Donaldson, vice-president of the Mosler Safe Co., that material was proven to be far superior to any other alleged torch-resisting materials. The demonstration was given in order to show just how burglar-proof the door of a new safe to be installed in a Dayton, O., bank has been made. Constructed of a sheet of donsteel and a core of the same metal, 6 inches thick, this safe door will foil the attempts of the most up-to-date and scientific safe breaker.

In the demonstration given, sheets of ordinary iron such as used in some cheap makes of safes were attacked with an oxy-acetylene torch. The material readily yielded and a 1-inch plate was cut through in less than two seconds. Then other types of safe metals were tested including such supposedly burglar-proof metals as chrome steel, compositions of steel and copper and mixtures of steel and carborundum. Each and every one of them yielded to the intense heat of the blow torches, proving that many of the so-called burglar-proof safes in use today can be readily rifled by means of an acetylene torch in the hands of an expert. With some of these materials, it was necessary to use what is known as the "fluxing iron" process, invented by Francis J. Napolitan, which consists of burning an iron rod against the sheet of metal to be cut with the torch. Doing this facilitates the work enormously and it is said that a process similar to this is used by many professional cracksmen. In any event, everyone of the metals tested, with the exception of donsteel, yielded quickly and easily.

After these tests were completed, they were all applied to donsteel and with this metal, even the usually effective fluxing-iron process failed. First, the sheath of donsteel was heated with an oxy-acetylene torch for five minutes and the surface remained unchanged. Then, a disinterested party of oxy-acetylene torch users attacked the same sheet and after two hours work had still failed to make any impression.

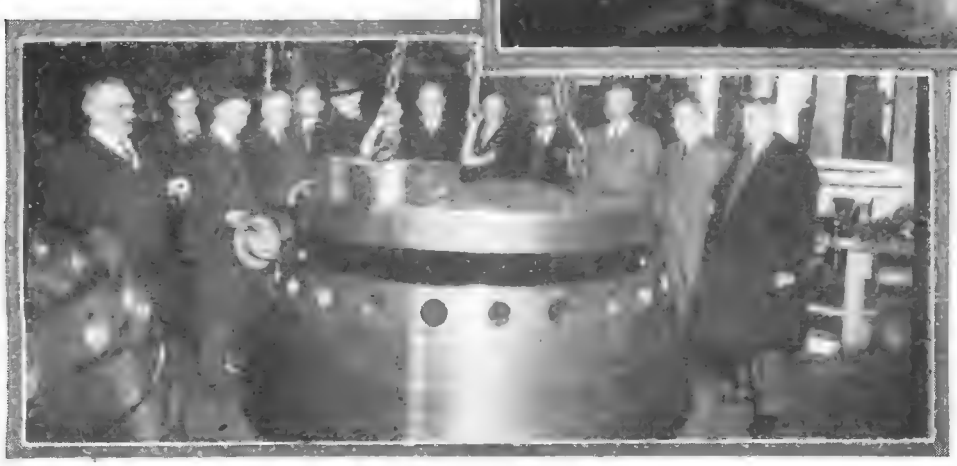
Then the 6-inch thick core of the safe door was tested. It could not be affected in any way by means of either an oxy-acetylene torch or a drill. The reason why both a sheath of donsteel and a thick core of the same metal is employed is because it is believed that the thinner sheath can be burned through if sufficient time is employed and that it can eventually be penetrated by a drill. However, the thick core is absolutely impenetrable by any known means and therefore, perfect protection is achieved by the combination employed.

The vault in which this door is to be placed will be 60x20 feet and the walls will be constructed of reinforced concrete several feet thick. The entire installation is so made as to be absolutely burglar-proof.

Our various photographs on this page show metals undergoing the test of enormous heat and the one at the bottom of the page shows the donsteel core being inserted in the sheath.

It is obvious from these tests that the most scientific cracksman with high speed drills and cutting torches would be foiled when encountering a safe door composed of donsteel. Even hours of work could not penetrate it, or even make an impression.

Right: Attacking a sheet of ordinary steel with an oxy-acetylene torch and cutting through it immediately. This demonstrates the lack of protection of an ordinary steel safe.



Above: When a sheet of the new donsteel was acted upon by the hottest possible flame, the results were absolutely nil. It was found impossible to penetrate the sheath and in fact, no noticeable impression could be made upon the material at all. Successive attempts extending over periods of hours were fruitless. The material was thus proven ideal for use in the construction of absolutely burglar-proof safes.

Left: Lowering the 6-inch thick core of donsteel into the outer sheath that comprises a vault door. The combination is thus made virtually burglar-proof and in fact could not be penetrated by any means that is at the command of the present day safe breaker. In combination with a reinforced concrete vault, perfect protection is achieved.

www.americanradiohistory.com

# The New Cosmic Ray

## The Existence of a New "Cosmic" Ray With a Wave-Length of But One Ten Millionth That of Ordinary Light, Has Been Shown in a Recent Series of Interesting Experiments Described Here

By PROF. DONALD H. MENZEL, Ph.D.

PROBABLY what will prove to be one of the most startling and far-reaching discoveries of the year has just been announced by Dr. R. A. Millikan, director of the Norman Bridge Laboratory of Physics of the California Institute of Technology, Pasadena, California. In brief, it might be said that he has proved the existence of a super-X-ray, for it has many of the properties of that now well-known ray. Perhaps a short review of X-rays will not be amiss here.

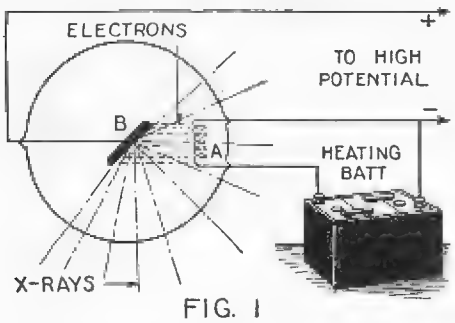



FIG. 1

Fig. 1 shows how X-rays can be generated which, up to a short time ago were thought to have the shortest wave-length of any existing rays.

X-rays, or Roentgen Rays as they are sometimes called, are produced when atoms are bombarded by very high speed electrons—electrons which have fallen through a potential drop of thousands of volts. (See Fig. 1). A is a hot filament, similar to the filament in a vacuum tube, for producing a stream of electrons which are drawn over to the anode B, a piece of metal, by the source of high potential.

### WAVE-LENGTHS OF NEW RAYS

Ordinary light is known to be a sort of wave-motion, the distance between wave crests being only about one-fifty thousandth of an inch. Small as this may appear, it is a large distance compared to the length of X-rays, which are shown in Fig. 2. The shortest rays yet investigated are the so-called gamma-rays emitted from radium, yet the new cosmic rays are fifty times shorter. Imagine a wave of ordinary light magnified 500 billion times (Fig. 3). It would then be two hundred miles long and would stretch from New York to Boston. If the new cosmic ray, however, were similarly treated its magnified length would be but one inch.

One of the most notable properties of gamma rays and short-wave radiation in general, is the remarkable penetrating power. A half-inch of lead is required to shield a person from the effects of the known gamma rays. The very fact that the new rays require *6 feet* of lead for the same purpose, is proof of their great power and short wave-length (Fig. 4).

### EARLY EXPERIMENTS

Professor Millikan's experiment was the culmination of an investigation covering a period extending over a number of years. The effects of these rays were first felt as early as 1903, when the British physicists, Rutherford and McLennan, studying an electroscope, found that the rate of discharge could be lessened by enclosing it inside a box of thick metal. Fig. 5 shows an electroscope. A is a metal rod from which are suspended two gold leaves B. The jar C is often of glass. When an electric charge is brought near the ball on the top of the rod A, some of it is conducted down the rod, thus charging the two gold leaves similarly. It is an elementary law of electricity that unlike charges attract while like charges repel, therefore the two leaves take the position (a) when the electroscope is charged and (b) when discharged. The discharge is always due to the conduction of the original charge outward or of a neutralizing charge inwards.

Suppose the electroscope charged and perfectly insulated from all stray sources of electrons. It would be reasonable to suppose that it would remain charged indefinitely. The British physicists found that the rate of discharge could be lessened by increasing the thickness of the sides of the box, nevertheless it could not be reduced to zero, as might be expected from the above reasoning. In fact,

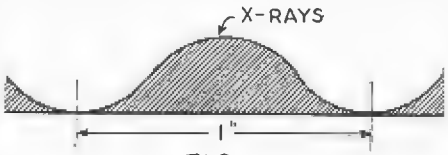



FIG. 2

If X-rays were magnified to the wave-length shown above, the length of the waves of ordinary length would be one-fifth of a mile.

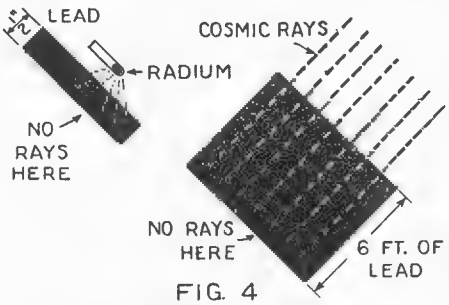



FIG. 4

Radium rays will penetrate less than one-half inch of lead, but cosmic rays, of much shorter wave-length will penetrate nearly six feet of the same material.

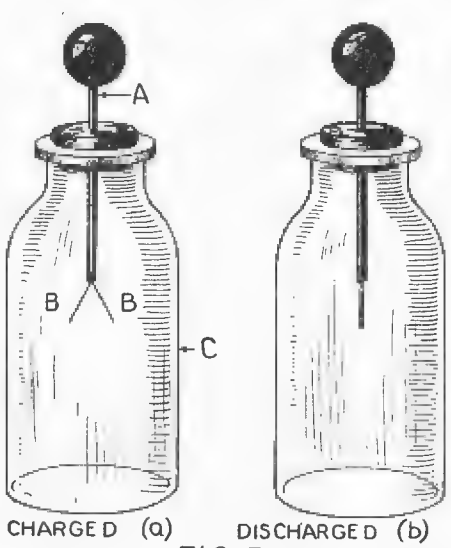
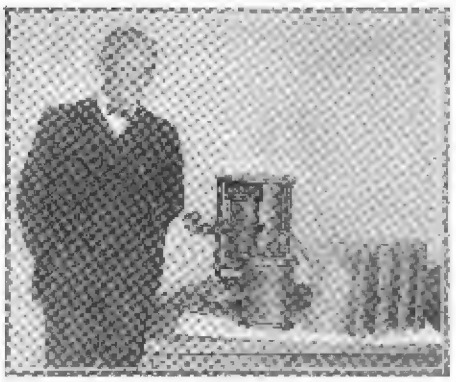



FIG. 5

A standard type of electroscope in a charged and discharged condition is shown in the illustrations A and B respectively. The text tells how this instrument aided in detecting cosmic rays.



The discoverer of the new cosmic ray, Dr. R. A. Millikan, is shown above with a device of his own design which made possible the discovery of these rays.

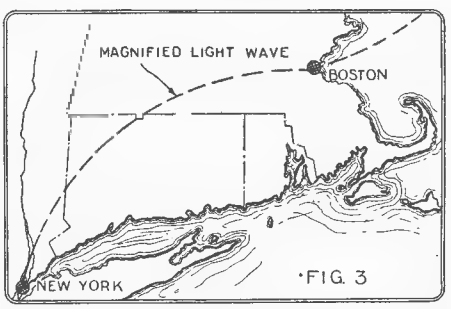



FIG. 3

If one wave-length of ordinary light were magnified to the size shown above, a cosmic ray enlarged to the same size would have a wave-length of only one inch.

Millikan's experiments prove that the walls would have to be six feet thick in order to exclude the cosmic ray. But what effect does this have?

We have already seen from Fig. 1 how X-rays may be produced. If the collision of an electron with an atom results in the emission of light, it is easy to see how the collision of an atom with an X-ray beam may produce electrons. It is a simple reversible process. Thus, as long as X-rays or cosmic rays are present, electrons will be found which will discharge the electroscope.

### COSMIC RAYS COME FROM BEYOND

At first it was thought that this new radiation had its origin in the earth's atmosphere. However, when balloons were sent up to a height of ten miles (see Fig. 7) at which altitude nine-tenths of the earth's atmosphere was below and only one tenth above, the radiation was discovered to be *more than twice as intense as at the surface of the earth*—proving definitely that it came from without.

Professor Millikan's next step was to find out, if possible, how penetrating was the new radiation. To accomplish this he sank his electroscopes and recording apparatus into Muir Lake, a body of water located on Mt. Whitney, the highest peak in the United States. It is almost unneccesary to state that his instruments were far more accurate than the simpler one drawn here, being equipped with an ingenious arrangement of moving film to photograph the rate of discharge. Though hundreds of feet deep, the main source of its water was from the melting snows—a necessary condition, for if its water had come long distances underground it probably would contain large quantities of dissolved radioactive salts which would produce the same effects and detract from the value of the measurements. It was found that the electroscopes did not stop discharging until at a depth of 45 feet below the surface of the lake. The air above the lake was equivalent to 23 feet of water and the total, 68 feet, was equivalent to six feet of lead, proving the remarkable penetrating power just mentioned.

(*Continued on page* 1147)

www.americanradiohistory.com

# Greatest Three Figure Number

GREATEST NUMBER WE CAN WRITE WITH THREE 9'S IS $9^{9^9}$

$9^9$ IS 9X9X9X9X9X9X9X9X9, 9 TIMES OR 387,420,489

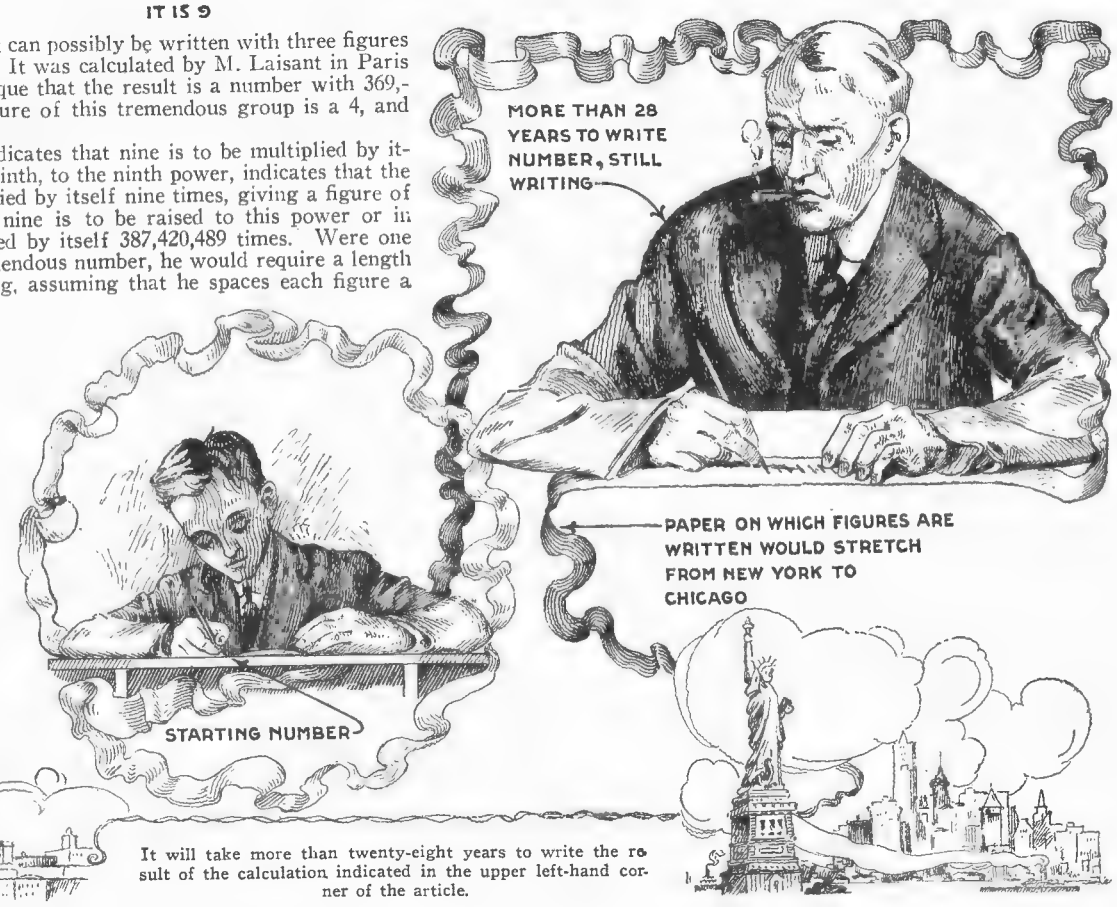
$9^{9^9}$ IS 9X9X9 ETC 9X9X9, 387,420,489 TIMES

THE RESULT IS A NUMBER WITH 369,693,100 FIGURES - THE FIRST IS 4, THE LAST FIGURE OF IT IS 9

THE greatest number that can possibly be written with three figures is that indicated above. It was calculated by M. Laisant in Paris in the Ecole Polytechnique that the result is a number with 369,693,100 figures. The first figure of this tremendous group is a 4, and the last one is a 9.

Nine to the ninth power indicates that nine is to be multiplied by itself nine times. Nine to the ninth, to the ninth power, indicates that the first exponent is to be multiplied by itself nine times, giving a figure of 387,420,489. Then the first nine is to be raised to this power or in other words is to be multiplied by itself 387,420,489 times. Were one man to start writing this tremendous number, he would require a length of paper about 919 miles long, assuming that he spaces each figure a distance of one-sixth of an inch from its adjacent figure. The paper tape would very nearly stretch from New York to Chicago. The necessary time to write this number would be twenty-eight years and forty-eight days, assuming that the individual wrote one figure a second, ten hours a day every day in the year.

In all mathematical practice it is the custom to remove the outermost conditions first. Consequently the first exponent of the nine is raised to its power first. HUBERT SLOUKA, Rep. No. 7110.


MORE THAN 28 YEARS TO WRITE NUMBER, STILL WRITING
PAPER ON WHICH FIGURES ARE WRITTEN WOULD STRETCH FROM NEW YORK TO CHICAGO
STARTING NUMBER

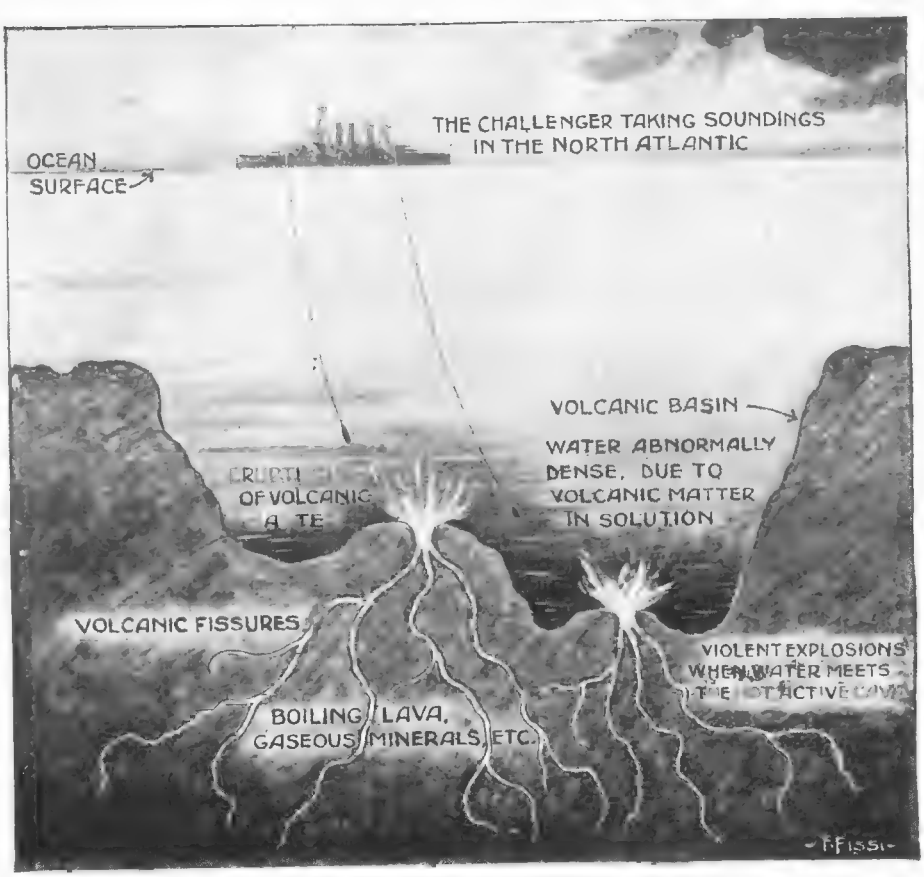
It will take more than twenty-eight years to write the result of the calculation indicated in the upper left-hand corner of the article.

# Undersea Volcanoes

ETERNAL infernos in submarine abysses, where titanic masses of water meet the unquenchable fires of the earth's interior, have recently been discovered and described by M. J. Thoulet of the Paris Academy of Sciences. Vast explosions, billows of steam under the ocean floor, miles deep, roaring and bursting of natural furnaces—these fiendish activities liberate huge quantities of volcanic matter and distribute it along the lower reaches of the watery depths. This happens especially in regions of the North Atlantic where it has often been suspected that the sea bottom contains volcanoes.

M. Thoulet arrived at these conclusions through his study of the soundings taken aboard H.M.S. "Challenger" on its recent oceanographic expedition around the world. He found that certain materials in solution in the sea-water at great depths became denser in some regions than in others. This unusual density, he concluded, can be explained only by the existence of submarine volcanoes, which give out materials which dissolve in the water.

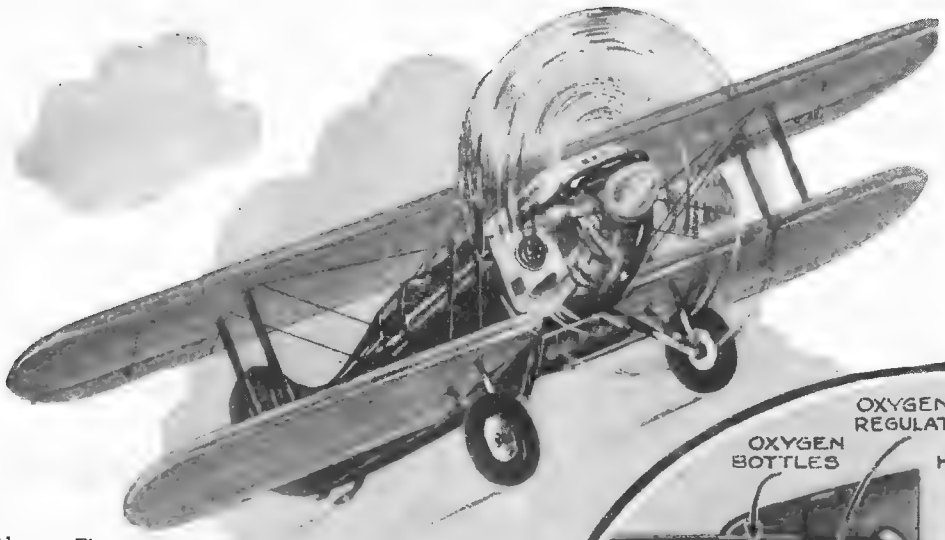
Thoulet now hopes to be able by his methods to locate the exact position of some of these submarine volcanoes, and perhaps to measure accurately the degree of their activity. At any rate, it is a quaint and startling notion for travelers to Europe to entertain—seething battles of fire and water far in the depths beneath them. Perhaps also this volcanic power will be harnessed some day—for submarine power stations for trans-atlantic liners—who knows?—ERNEST BRENNECKE.


THE CHALLENGER TAKING SOUNDINGS IN THE NORTH ATLANTIC
OCEAN SURFACE
VOLCANIC BASIN
WATER ABNORMALLY DENSE, DUE TO VOLCANIC MATTER IN SOLUTION
VOLCANIC FISSURES
BOILING LAVA, GASEOUS MINERALS, ETC.

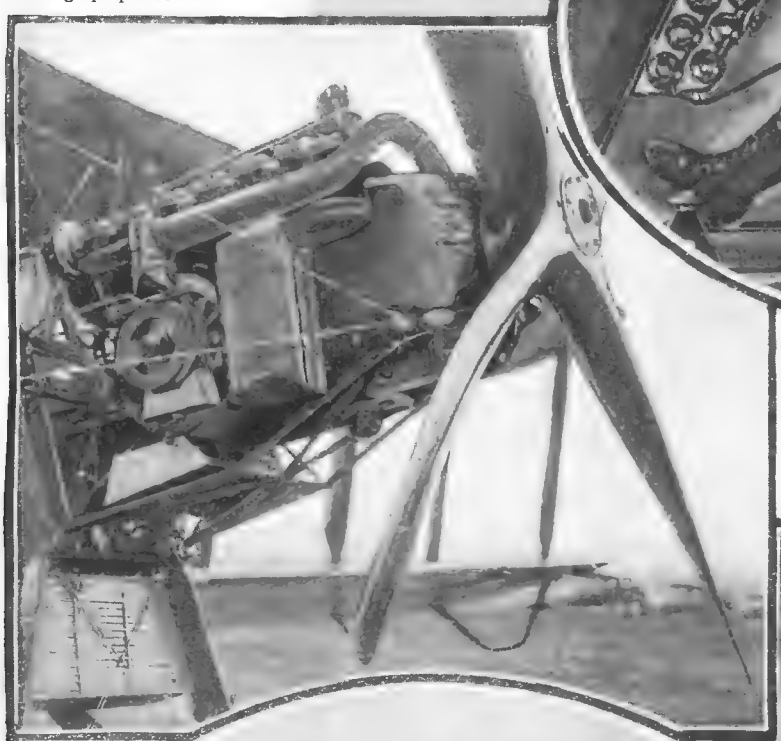
www.americanradiohistory.com

# Reaching Great Altitudes

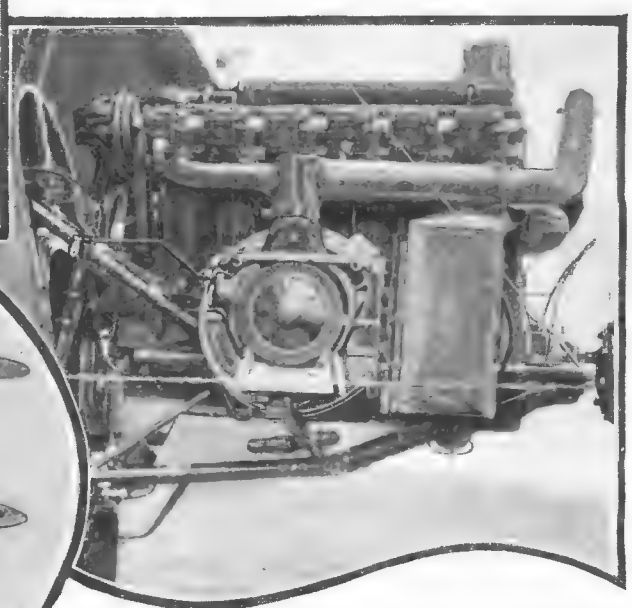
## Many Precautions Must Be Taken and the Special Apparatus Used Is Illustrated

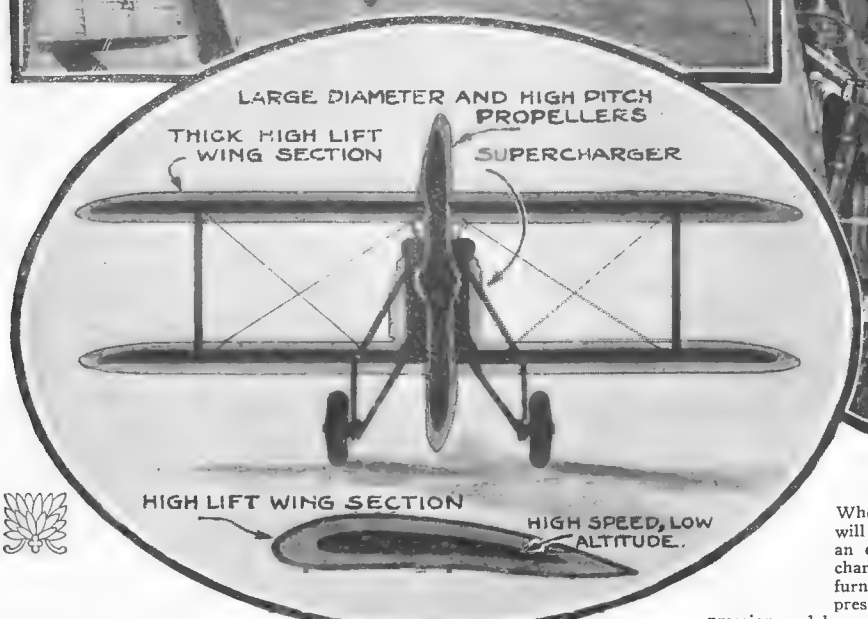


Above: The appearance of a plane especially equipped and designed for high altitude work. Note thickness of wings, and large propeller.



Above: A cross-sectional view of the cockpit of a high altitude plane. The pilot is supplied with oxygen from tanks in order to sustain life, while the cockpit is electrically heated and insulated with felt corduroy. Left: New type of geared Liberty motor equipped with supercharger and air cooling system for flying at the absolute ceiling, where the air is very rare and makes flying difficult.




LARGE DIAMETER AND HIGH PITCH PROPELLERS
THICK HIGH LIFT WING SECTION
SUPERCHARGER
HIGH LIFT WING SECTION
HIGH SPEED, LOW ALTITUDE.

Black portions above show approximate proportions of standard airplane, whereas the shaded parts show where dimensions must be enlarged for high altitude flights.

When traveling at great altitudes, an ordinary gasoline engine will not function properly. Due to the rarefied atmosphere, such an engine will not obtain sufficient oxygen. Therefore, a supercharger or rotary air turbine is employed to compress the air and furnish it to the motor in the same quantities and at the same pressure as is obtained at sea level. During the process of compression and because of the fact that the supercharger is driven by the exhaust gases, the compressed air becomes very hot. It must be cooled before it enters the intake manifold, and this is done by means of the cooler located directly in front of the supercharger in the above photo. The pressure delivered by the supercharger is controlled by the operator of the airplane.

www.americanradiohistory.com

# New Plane Seeks Altitude Record

By WILLIAM P. SULLIVAN, Aeronautical Engineer

THE latest design in high altitude airplanes, using a special supercharged Liberty motor, is being tested by the United States Army at McCook Field, Dayton, Ohio, in hopes of bringing back to the United States the world's altitude record, now held by M. Callizo, a Frenchman, who attained an altitude of 39,586 feet in a specially constructed airplane, designed to meet conditions at high altitudes. This new design has many new features, including a specially constructed cockpit with its interior completely lined with plywood, covered with a quilted felt corduroy and electrically heated to withstand the terrific cold. The propeller is of large diameter, constructed from aluminum alloy and having variable pitch blades, which are adjustable from the pilot's cockpit. The wings are very large and of a special, thick, high-lift section, having an area of 600 square feet, with an aspect ratio of ten.

The heart of a machine of this sort lies in the ability and efficiency of the motor to function properly in the rarefied atmosphere at high altitudes. To bring this about, the motor is equipped with a special supercharger, which maintains a constant sea-level pressure of the atmosphere at all altitudes, enabling the motor to operate the same at altitudes of 30,000 feet or more, as it would at sea level.

This supercharger consists of a turbine-driven blower connected directly to the exhaust and intake manifolds of the motor. The turbine derives its power from the exhaust gases of the motor, which, in turn, rotates a blower pump. The entire supercharger itself becomes very hot, because of the use of the exhaust gases, and this heat is radiated out by air-cooled fins about the turbine. The compressed air from the blower, in turn, becomes hot, due to both its rise in pressure and to its passage through the hot supercharger, and has to be cooled before it enters the intake manifold. This is done by passing it through a cooler, which is similar to a water radiator, and the cooled air, under the desired pressure, enters the carburetors. This pressure is controlled from the pilot's cockpit by operating a relief butterfly valve situated at the rear of the supercharger. As the plane continues to climb in rarefied atmosphere, this valve is gradually closed so that finally all the air sucked in by the blower goes directly to the carburetors. As the altitude increases, the pilot adjusts the valve, keeping the motor running efficiently, as one might adjust a carburetor on an automobile. Finally, a limit is reached by the supercharger, and from this point up, the power of the motor begins to decrease, until the power delivered by the motor does not produce thrust enough to drive the plane at a speed sufficient to lift. This point is called the *absolute ceiling* of the airplane.

The propeller, which is designed for the power-plant of high-altitude planes, is next to be considered. A propeller adapted to work efficiently at high altitudes must be of large diameter, large wing area and high pitch, which would be useless at sea level. This is due to the fact that, being designed for rarefied air, the air at sea level offers too great a resistance, so that the revolutions per minute would not be enough to furnish the thrust necessary for flight. Up to the present time, a sacrifice of high altitude efficiency has had to be made in order to enable the plane to leave the ground.

The propeller of the new design has what is known as variable pitch blades, that is, the blades rotate in sockets at the hub, in order to change their pitch while in flight, and are controlled by the pilot from the cockpit. This enables the pilot to set the blades at any desired pitch angle, where the thrust is most efficient for the altitude in which the plane is flying. This pitch of the blades can be continually adjusted until it also reaches a limiting point of efficiency.

The next important feature is the wing design. The limiting factors of this portion of the plane are flexible enough to allow a design of high efficiency in rarefied air, while at sea level the loss of speed would be most noticeable, due to the greater resistance or drag, caused by the greater atmospheric pressure and a loss of lift, due to loss of speed, but not enough to be of paramount importance. As the plane acquires altitude, the lift-over-drag ratio would increase until it reached its most efficient working point, equal to that of the power plant.

The pilot must be considered as to his comfort and equipment. The cockpit must be enclosed as much as possible and lined with a warm covering of heat-retaining material and supplied with sufficient oxygen to facilitate breathing in the rarefied air throughout the climb. This oxygen is carried in a number of small metal bottles, coupled together and connected through a regulator valve, to a specially heated helmet and mask fastened to the pilot's head. The flow of the oxygen is controlled by the pilot by adjusting the regulator valve.

In climbing to the high altitudes, the pilot is kept busy adjusting all these instruments, due to a steady changing atmospheric pressure; especially, he must keep the oxygen system adjusted according to the height, which is absolutely essential to sustain life; also, the heating appliances that supply heat to the pilot's body in the extreme cold are to be under control. Hence, to establish a new altitude record means a man-size job, both on the part of the pilot and of the engineers, who all join in accomplishing it.

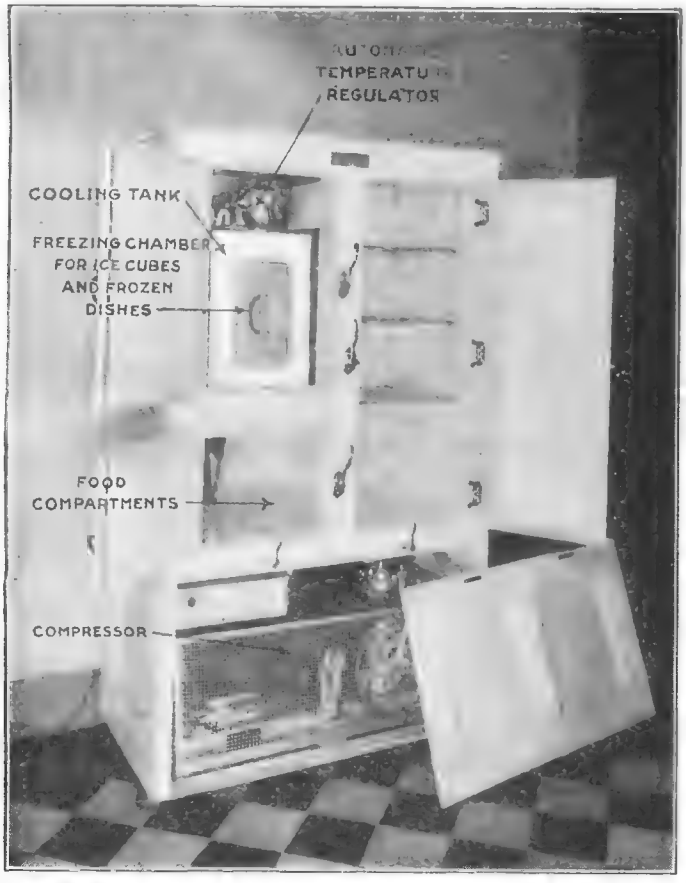
## Distribution of Electricity

17,000,000 ELEC. LGT. & POWER CUSTOMERS IN U. S.
14,000,000 HOME USERS
REMAINING 3,000,000 COMMERCIAL AND INDUSTRIAL USERS
ELEC. REFRIGERATOR
ELEC. REFRIGERATION IT IS CLAIMED WILL DOUBLE REVENUE OF ELEC. LGT. & POWER CO'S
$ 25.00 AVG. ELEC. LGT. BILL PER YEAR
$ 50.00 PER YEAR

The average person will undoubtedly be surprised to learn that the largest consumer of electrical current in this country is the home user. Out of 17,000,000 customers, 14,000,000 of them are in homes throughout the country. Today, the average electric light bill is approximately $25 per year. If electrically operated refrigerators are installed in all homes, the yearly electric light bill will be practically doubled, but at the same time, the cost of refrigeration by electricity as compared to that by ice will be substantially less.

www.americanradiohistory.com

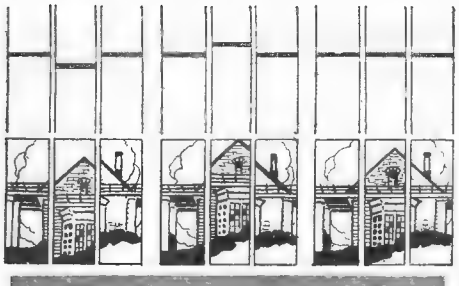
# New Electric Refrigerator




A new electrically operated refrigerator that is entirely self-contained is illustrated above. A small compressor located in the base compresses the refrigerating gas to a liquid which, expanding subsequently and at a very low temperatures, circulates through pipes around the food compartments and the freezing chamber. An automatic temperature regulator keeps the temperature constant.

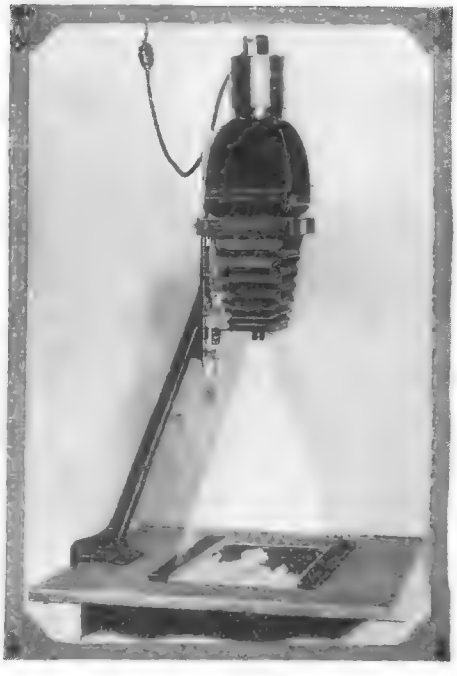
The refrigerating substance that is used in this modern "ice box" is used over and over again and lasts for many years. The photograph above shows an interesting experiment performed with the liquid substance when it is at a temperature of 10° below zero. When poured into water, an "ice explosion" takes place. This photo was taken at a speed of 1-1500th of a second and the explosion took place in just that time.

# New Photograph Accessories



A NEW instantaneous range finder that is designed for use on small hand cameras is illustrated in the photograph in the lower left-hand corner of this page. By looking through the top of this instrument with the eyes quite close to it, the object upon which the photographer is focusing will be seen broken up into three distinct parts. If the camera is not focused properly, these three parts will be out of line as shown at the left, but when the lens is brought into proper focus the three sections line up as in the extreme right-hand diagram at the left. The range finder must be designed for the lens in use.

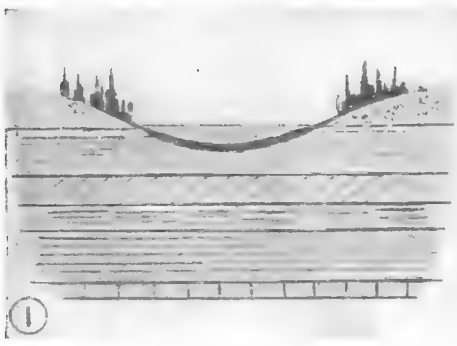
A SELF-FOCUSING enlarging device designed especially for the amateur photographer is illustrated in the photograph at the right. The light necessary for enlargement is supplied by an ordinary incandescent bulb connected to the house lighting circuit. The film or plate to be enlarged is slipped into a convenient and readily adjustable holder and placed in the camera directly above the bellows. By pulling the device up or down on a specially designed rack, the picture can be made as large or as small as desired within the limits of the apparatus. An ingenious cam arrangement keeps the focus constant, and no adjustment of it is necessary.



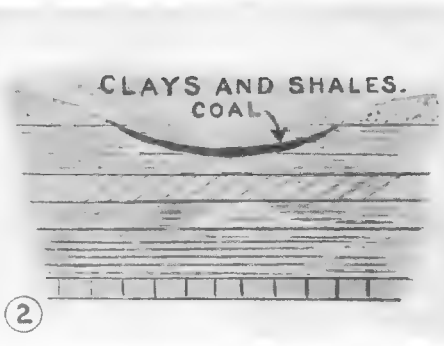
www.americanradiohistory.com

# The Story of Coal

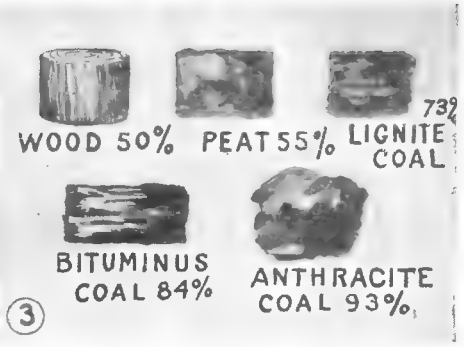
By J. E. BYRON, Mining Engineer



Forests and plant life of the coal period were deposited in water, and formed a constituent of bogs like peat bogs of today.

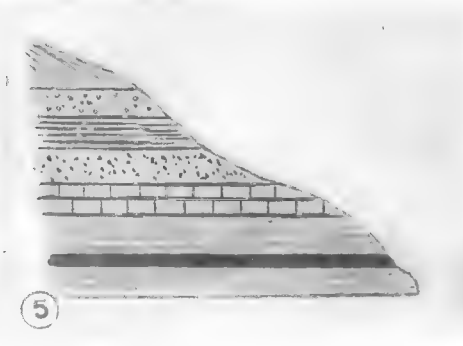



The depression was filled by clay which gives shale, and the covered vegetation formed coal. Amount of covering pressure and heat determined the kind of coal.

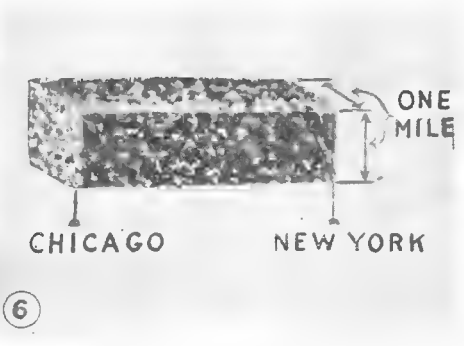



The amount of carbon that is found in wood, in peat and in various kinds of coal can be seen above. Anthracite is richest in carbon.

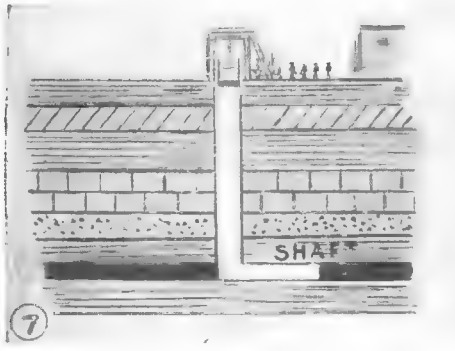
The first use of coal that historical records show was by the ancients living in about the year 300 B. C. It was used in open fires.



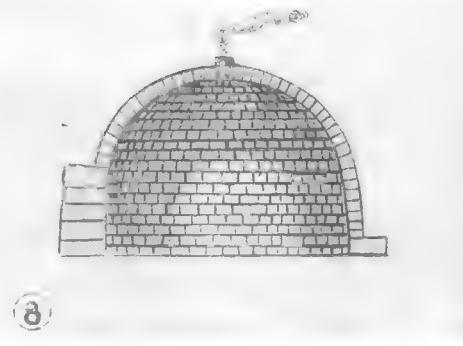
Bituminous coal was first discovered in the United States in an out-cropping near Richmond, Va., in 1750. The vein ran about as shown above.



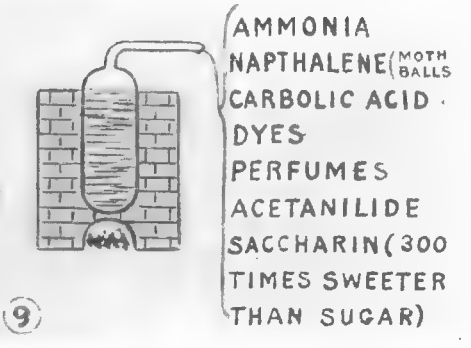

The available coal in the United States would form a wall one mile square in cross-section reaching from Chicago to New York.




There are at the present time 600,000 men employed in the coal mines of the United States. They supply us with most of our fuel.

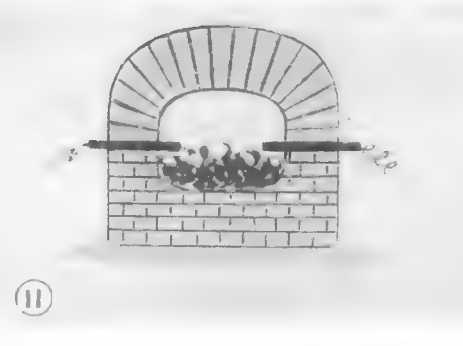


When coal is treated in coke ovens, it produces coke and also gives forth coal tar, many products of which are useful.

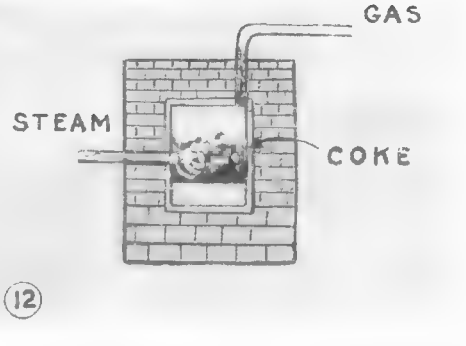



When coal tar is properly distilled and treated, it produces many valuable products, a few of the most important of which are listed above.

When coke and sand are melted together in an electric furnace, carborundum that is used for grinding purposes is produced.



If, on the other hand, coke and limestone are ignited together, calcium carbide is produced from which acetylene gas is obtained.




Artificial gas is produced by heating together coke, steam and oil vapor in a furnace as is shown diagramatically above.

www.americanradiohistory.com

# Awards In $5,000.00 Matchcraft Contest

The Evening World
Samples of Matchcraft
DAILY MAGAZINE
Were Built With Matches
MATCHCRAFT
What Can You Do With Matches?
$250 Weekly in Cash Prizes
First Prize, $100
Second Prize, $50. Twenty Prizes, $5 Each
UKELELE WINS FIRST PRIZE
First Prize $100.00—The ukelele made by Gene Allen, of Independence, Mo., won the first prize in this month's awards. It is shown on this page, together with newspaper clippings from New York's daily papers.
NEW YORK HE
ork Tri
New York American
New York Times
Make Violins and Ships From Match Sticks; Shut-Ins Display Skill in $5,000 Contest
Note to what extent the "matchcraft" contest is appealing to the general populace.
New York Evening World contest prize winners will be entered in the national SCIENCE AND INVENTION Contest.

The New York Evening *World* is conducting a Matchcraft contest of their own, operating in conjunction with SCIENCE AND INVENTION Magazine and offering an additional $1,000.00 in prizes. The winners in that contest will be automatically entered in the SCIENCE AND INVENTION National contest.

# $5,000.00 Prize "Matchcraft" Contest

WATCH FOR PRIZES IN MAY ISSUE

FOR the next ten months, SCIENCE AND INVENTION magazine will award a total of $5,000 in prizes, in a new contest. You are asked to make models, fashioning the same entirely from safety matches. Please observe the following simple rules:

(1) Models submitted must contain at least 90 per cent. safety matches in their construction.

(2) Models made of toothpicks, paper matches, or non-safety matches, are not eligible in this contest.

(3) Models can not be built around boxes or other supporting articles. Walls, roofs, etc., must all be self-supporting and made of matches.

(4) All liquid adhesives, such as glue, shellac, cements, etc., are permissible.

Water Glass makes a good glue and may be used to coat the model giving it a glasslike appearance.

(5) Models may be painted, gilded or silvered.

(6) Models may be of any size.

(7) In order to win a prize, it is necessary that either models be submitted, or, if this is not practical, owing to their size, a 5"x7" photograph of the model may be sent in lieu of the model itself. The best models submitted each month will be awarded the prizes scheduled herewith.

## 16 Monthly Prizes

| | |
|---|---|
| First Prize | $100.00 |
| Second Prize | 75.00 |
| Third Prize | 50.00 |
| Fourth Prize | 35.00 |
| Fifth Prize | 25.00 |
| Sixth Prize | 20.00 |
| Seventh Prize | 15.00 |
| Eighth Prize | 12.50 |
| 9th to 16th Prizes of $10.00 each | $80.00 |

(8) All models submitted to SCIENCE AND INVENTION Magazine will be promptly returned to the builder, who will prepay all charges.

(9) Where SCIENCE AND INVENTION has any doubts as to the model (where photos only are submitted) complying with all the regulations, the judges may, at their discretion, request that the actual model be sent in for inspection, paying transportation charges both ways.

(10) This is a monthly contest, lasting for twelve months, each monthly contest closing on the first of the month following date of issue. This contest for the month of April will close May 1, 1926, and prize winning announcements will be made in the July, 1926, issue. The May issue will contain February prize winning entries.

(11) Models must be shipped in a strong wooden box, never in a cardboard box, as SCIENCE AND INVENTION can not be held responsible for breakage in transit due to models having been improperly packed.

(12) When models are sent, be sure to affix tag, giving your name and address, to the model itself. In addition, put name and address on outside wrapper of package.

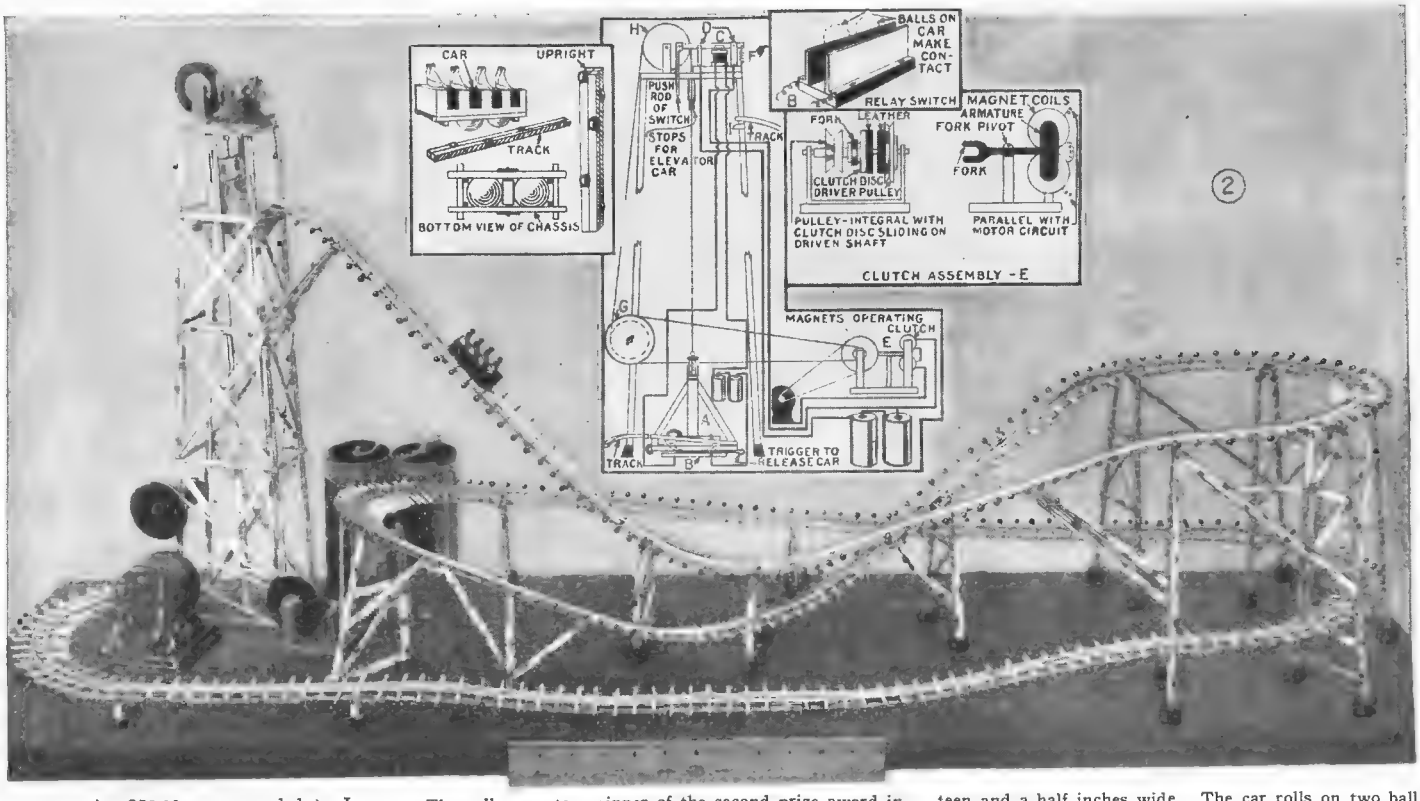
(13) Address all letters, packages, etc., to Editor, "Matchcraft" Contest, care SCIENCE AND INVENTION Magazine, 53 Park Place, New York.

**Caution—Soak or cut heads from matches before building your model so that the models may be expressed or mailed.**

**REMEMBER— This is a monthly contest offering sixteen prizes every month. Don't hesitate, send in your model now!**

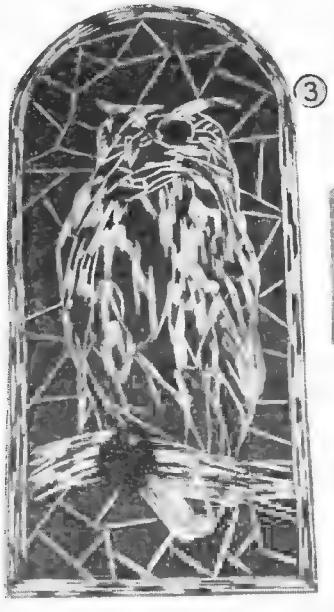
www.americanradiohistory.com

# Prize Winners in the February Contest



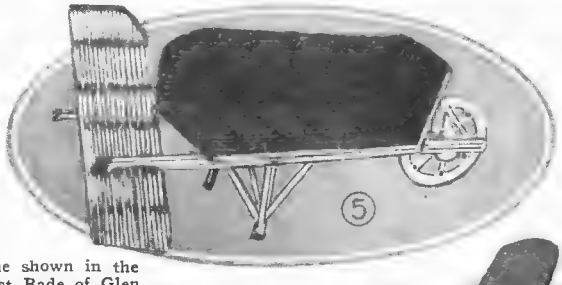

Second prize $75.00 was awarded to J. S. Buynitsky of Washington, D. C., for the scenic railway above. It took six weeks to make this model.

The roller coaster, winner of the second prize award in this month's contest consists of a tower from which the car starts at a height of fifteen inches. There are sixteen feet of track and an automatic elevator which raises the car from the bottom of the tower to the starting point. The entire device is automatic. The matches were boiled and bent on phonograph needle forms to produce the curves and were then trimmed with sandpaper. The model is fifty inches long, thirteen and a half inches wide. The car rolls on two ball bearings which also serve to make the contact for the relay and the motor operating the hoist. Car entering elevator car A, causes steel balls to make contact across B, closing relay circuit operating magnet C, which pulls down knife switch D, completing circuit through clutch assembly E, and motor. The drum winds up lifting car to top, by gravity when clutch opens, due to circuit being opened.

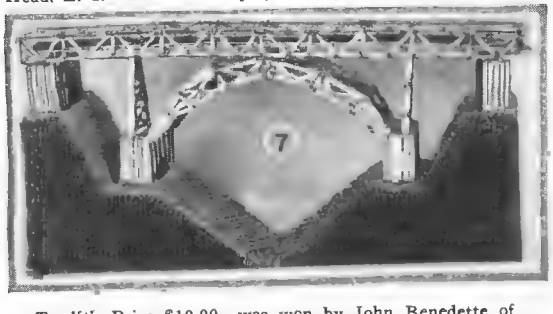



Sixth Prize $20.00—The owl wall placque shown in the photograph above was made by Dr. Ernest Bade of Glen Head, L. I. Dr. Bade employed unique construction.

Eighth Prize $12.50--was awarded to Dr. Charles F. Bassett of Chicago, Ill., for the manor lift gate here illustrated. The design is original.

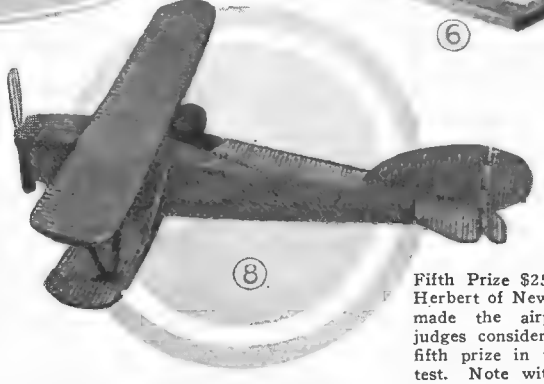


Third Prize $50.00—was given to Mr. E. Morgan, of New York City for this splendid model of a church. Even the interior of this model is complete to the pews, and altar.




Twelfth Prize $10.00—was won by John Benedette of New York City for the model of the Garabit Viaduct bridge. Cross section of the earth is made of matches.

Ninth Prize—$10.00 — was won by the wheelbarrow construction illustrated in photo 5 above. This award goes to Mr. Fred Spinden of Abingdon, Illinois. It will be remembered that Mr. Spinden won the third prize for his wagon construction in the March issue.

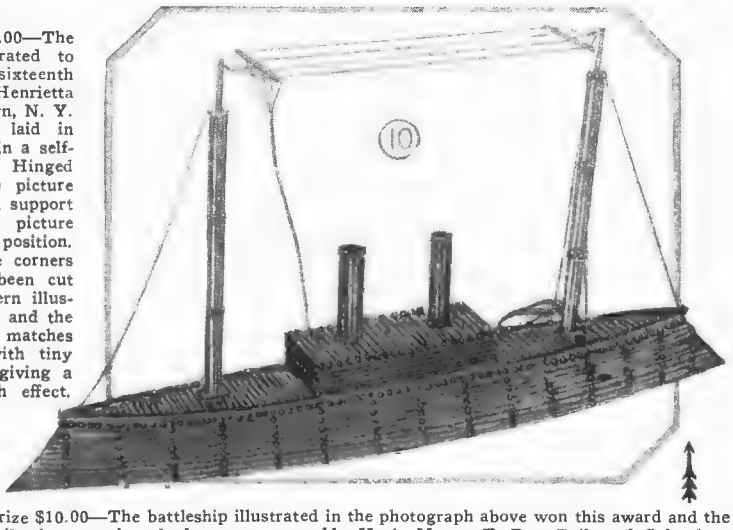



Fifth Prize $25.00—Mr. Eugene Herbert of New Rochelle, N. Y., made the airplane which the judges considered worthy of the fifth prize in this month's contest. Note with what care the matches were laid in place. Most of the heads were cut from the matches and the entire model was carefully sandpapered so as to make it smooth.

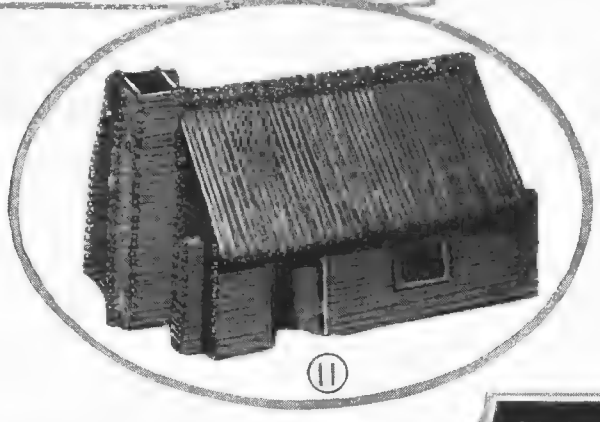
www.americanradiohistory.com

# More "MATCHCRAFT" Prize Winners

Sixteenth Prize $10.00—The picture frame illustrated to the left won the sixteenth prize for Miss Henrietta Abramson of Brooklyn, N. Y. The matches were laid in place very carefully in a self-supporting frame. Hinged to the back of the picture frame one will find a support which holds this picture frame in an upright position. The matches for the corners of the frame have been cut up, so that the pattern illustrated can be formed and the back ends of the matches have been tipped with tiny drops of red paint, giving a double headed match effect.



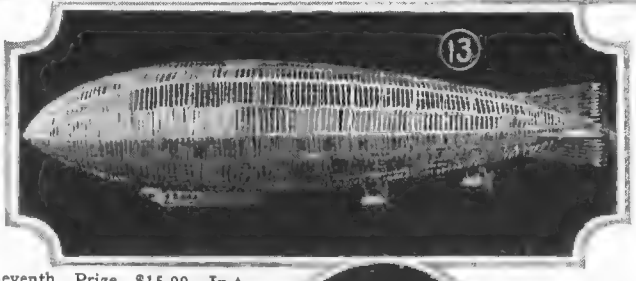
Fifteenth prize $10.00—The battleship illustrated in the photograph above won this award and the lad who built the same is only fourteen years old. He is Master E. Don Bailey of Columbus, Indiana. Although the model is not complete in every detail, great care was taken to make the ship smooth and present a more or less professional appearance.



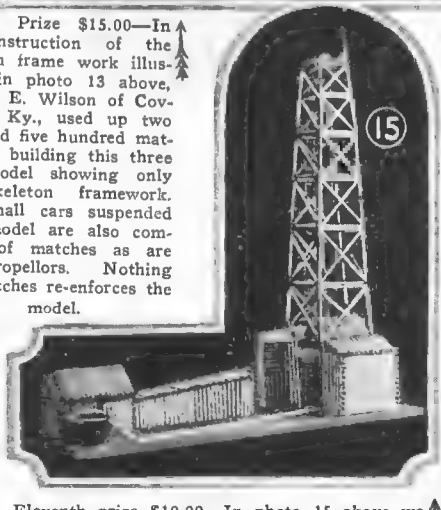
Fourteenth prize $10.00—Mr. Harvey Bixby of Laporte, Indiana, took a lot of time to build the log cabin illustrated above. At first glance it would not seem as if this model is difficult to construct, but every match has been so cut that it dove-tails with the match crossing it.

Tenth prize $10.00—Mr. W. S. Hendren of Nicholasville, Kentucky, sends us the model village illustrated in photo 12. In this village everything is constructed of matches; even the trees in the foreground are made by shaving into the sides of a match producing leathke growths. The automobile, wind mill, garage, houses and fence are all constructed entirely of matches.

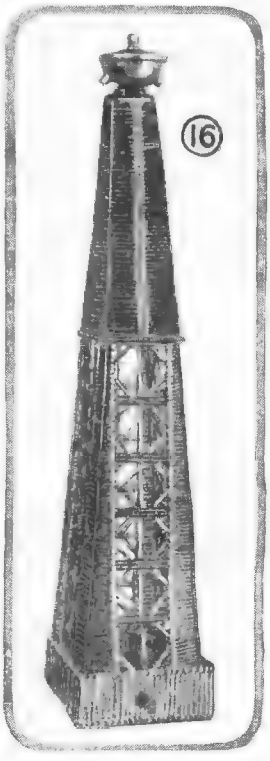
A model village is illustrated above and a lamp stand below.



Seventh Prize $15.00—In the construction of the Zeppelin frame work illustrated in photo 13 above, Mr. F. E. Wilson of Covington, Ky., used up two thousand five hundred matches in building this three foot model showing only the skeleton framework. The small cars suspended from model are also composed of matches as are the propellors. Nothing but matches re-enforces the model.



Fourth prize $35—It is really surprising to note how strong a well constructed lamp stand can be even though it is made entirely of matches. Mr. A. W. Kingman of Hammond, Ind., showed us how this should be done and thereby won the fourth prize in the national matchcraft contest. A little time, a few matches, a pot of glue and you can also win some of these prizes. Try it.



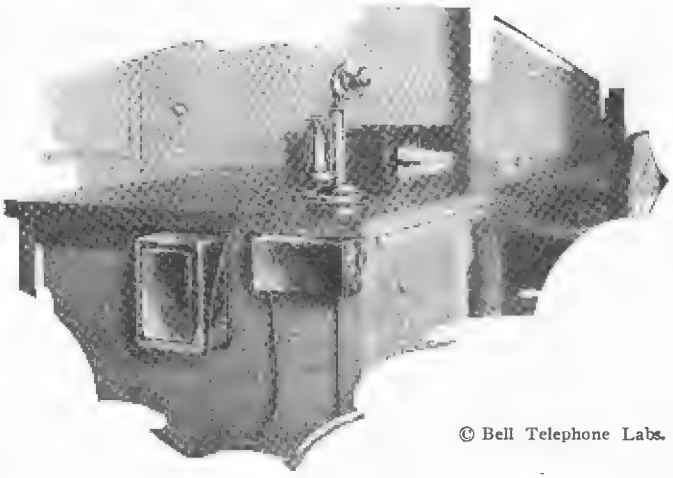
Thirteenth prize $10.00—The model of a wall clock illustrated above was made by Charles Komunicki of New York City. In the last issue his automobile won one of the awards.

Eleventh prize $10.00—In photo 15 above we see a model of an Oklahoma pumping station which should be fairly accurate, inasmuch as it was made by Mrs. W. S. Greenlie of Homony, Oklahoma.

www.americanradiohistory.com

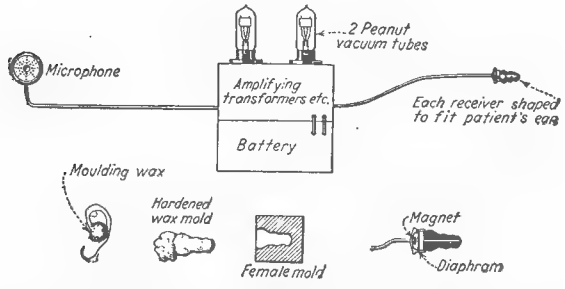
# Telephone Amplifier for the Deaf

The latest aid to the deaf has recently been developed by the Bell Telephone Laboratories and has been designed in two different forms. Not only is the system adaptable to assist the deaf in ordinary conversation, but it can also be employed in connection with a standard telephone, so that the patient can hear more plainly. The device, in connection with a microphone is shown in use above.

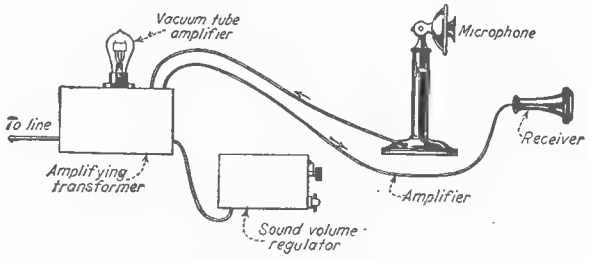


© Bell Telephone Labs.

Here the new system is connected with an ordinary telephone. Amplification is obtained by using vacuum tubes in a standard circuit.

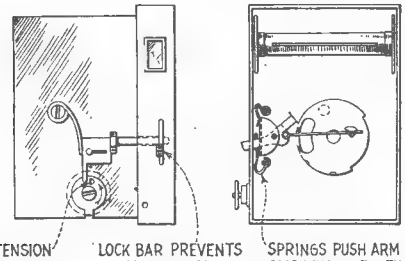



The instruments used in this new deaf phone are shown above and the method of making the small ear pieces is also illustrated.




Here the vacuum tube amplifier is connected in the receiver circuit of an ordinary telephone so as to render reproduced conversation louder.

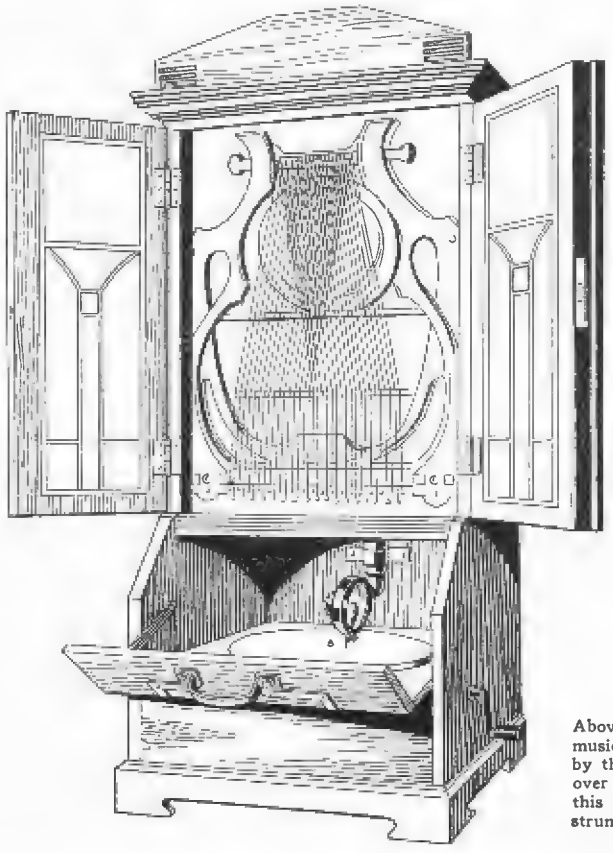
## Camera Aid


EXTENSION ON SPOOL RELEASES LOCK
LOCK BAR PREVENTS MOVEMENT OF THIS ARM
SPRINGS PUSH ARM UP SLIGHTLY WHEN FILM SPOOL LUG RELEASES LOCK BAR

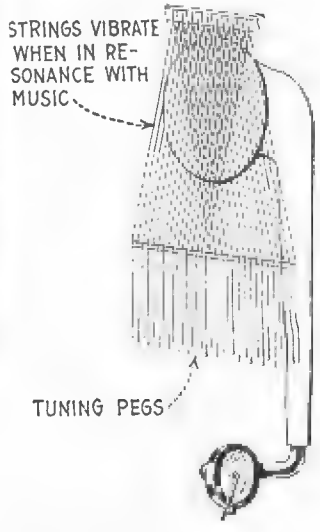
Very often the amateur photographer fails to wind the film after having taken a picture and consequently makes a second exposure on the same frame. This is prevented if the device shown above is employed. The lock bar, which is retracted by a projection on the winding spool, prevents another exposure after one has been taken, until the take-up spool is turned. The secret lies in the springs shown in the right-hand drawing above.

—A. C. Fischer.

## A Musical Talking Machine



Left: The newly developed musical talking machine opened, showing record table, reproducer and strings.




Above: A diagramatical view of this new musical instrument. Note the form taken by the strings so that all of them will pass over the mouth of the horn. Aside from this string attachment, the rest of the instrument is designed along conventional phonograph lines.

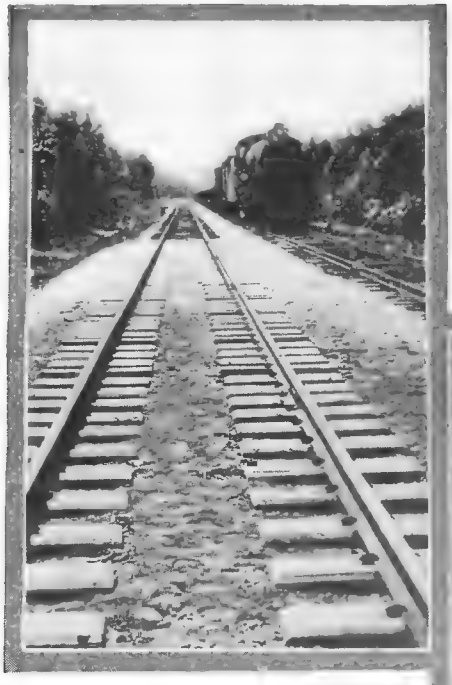
In a novel type of talking machine that has recently been placed on a foreign market, the sound waves set up by the action of the record on the reproducer needle are given forth through the strings on the sounding board shown clearly at the right. The waves vibrate these strings and lend an unusual tone to the consequent reproductions. The strings are kept in tune in the same way as a piano and those in resonance with the sound waves are set in vibration.

www.americanradiohistory.com

# Photos from the Scientific World

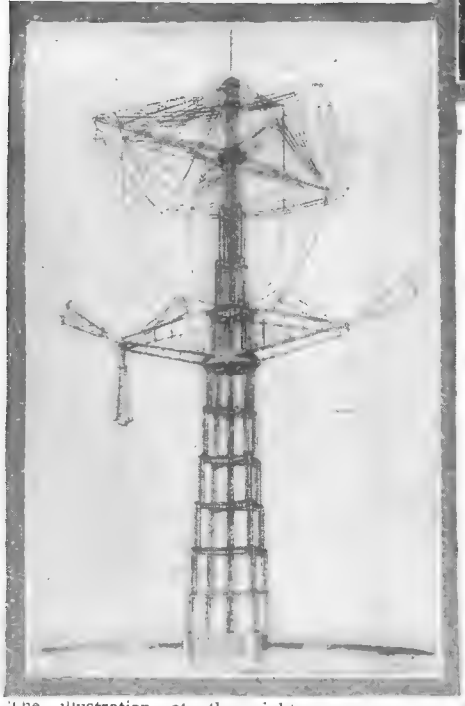
## What Scientists Are Accomplishing and Discovering

Left: Concrete cross ties for railroads have been adopted by the Bangor and Aroostook Railroad, replacing the ordinary wooden ties which in that locality are scarce and very expensive. The new ties are very satisfactory.

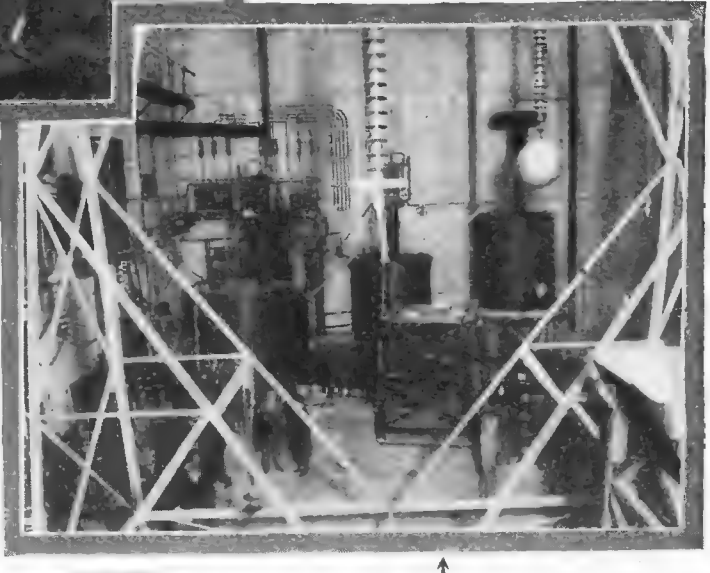


Another triumph of German ingenuity is depicted in the photograph reproduced above. Gigantic halls, constructed entirely of concrete, have been constructed and are in use for the preservation of crude sulphur. All of the supporting beams as well as the cross pieces and other girders are of reinforced concrete. The total length of these halls is in excess of 300 feet, the width is somewhat greater than 60 feet and the height is about 50 feet.

Below: A new system for obtaining electrical energy from the air has been devised by German scientists and the tower illustrated will be erected at Leipzig. It will be the highest structure in the world, towering to 1,800 feet above the surface of the earth, or 300 feet higher than the Eiffel Tower. The rotating wings it is said will generate power steadily, regardless of how little wind is blowing.



A specially designed transformer shown in the photograph at the right has recently been installed in the California Institute of Technology. It delivers one million volts and is capable of producing sparks of enormous length. One of these sparks, produced between a point and a ball is shown above. Note the flaming effect produced. The purpose of this installation is to test insulation values, to produce artificial lightning for demonstration and to conduct experiments with radio transmission of power.



Above: A view of the electrical laboratory of the California Institute of Technology.

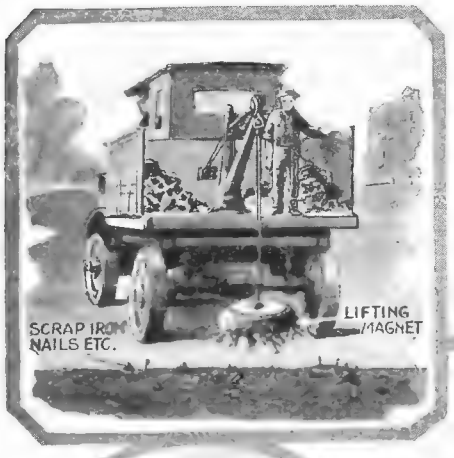
The illustration at the right shows how the natives of Mongolia build their homes. A framework of sticks is first constructed and then covered with a thick felt made from sheep's wool. The door is especially unique in construction as it does not open outward or inward but folds together after the fashion of an ordinary elevator door. In fact, the entire hut is made in a similar manner so that the walls can be folded up and the home transported to any place desired. The construction is plainly shown.

©Amer. Museum of Nt. History.

www.americanradiohistory.com

# The Month's Science News Illustrated

By GEORGE WALL



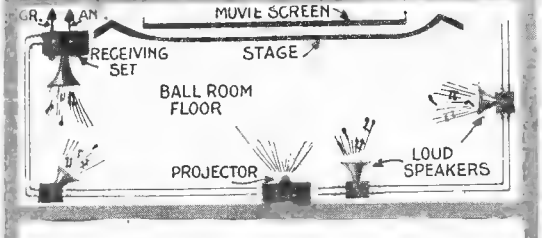

Left: A 36-inch lifting magnet was recently carried back and forth over a 7-mile stretch of road and it picked up 603 pounds of nails, tacks and scrap iron in that distance.

Below: For a long time, people near a certain power house were greatly annoyed by a mysterious hum. Numerous scientific investigations failed to locate the cause, but finally a workman placed a sheet of tin in the ash pit of a boiler and the hum stopped.

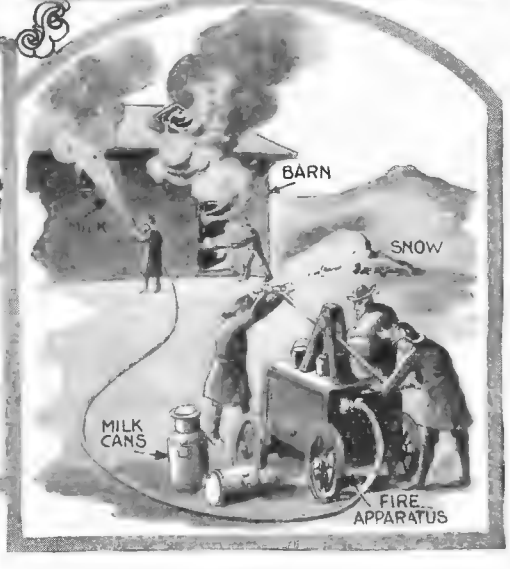
Above: After living for a week in a sealed room and breathing the same air continually, the experimenter's blood turned blue.

The original principles of cooking are still in use among certain savage tribes and one of the most important of them is illustrated above.

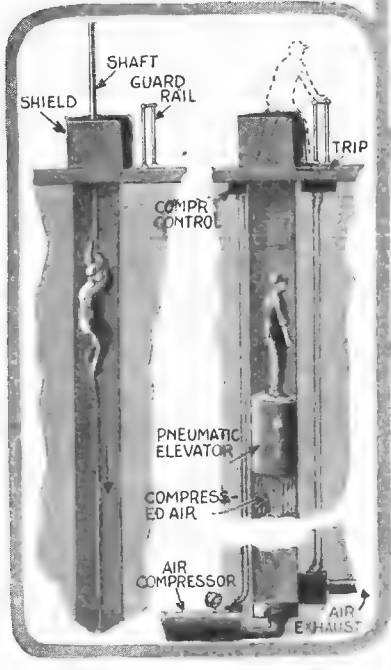
A new type of thermostatic alarm device to be used for protecting safes has recently been developed and it is so sensitive that it will respond to imperceptible changes of temperature. When a person enters the room in which it is concealed, the alarm sounds. It would certainly take a cold-blooded burglar to rob a safe protected with this device and even then, if he used a blow torch, the heat of that instrument would immediately sound the alarm.




A combination of radio and motion picture has recently been perfected and a demonstration given in New York City. Motion pictures of a well known orchestra in action were shown and the accompaniment was supplied by radio.




When fighting a fire in a small town, the water supply gave out and inasmuch as other buildings were threatened with destruction if something drastic was not done, the firemen poured cans of milk into their pumps and forced the lacteal fluid through the hose and directed the stream against the fire. Loads of snow were also pressed into service and shoveled into the fire in an attempt to prevent its spread.




In a large newspaper office, stairways have been eliminated and communication between various departments on adjoining floors is effected by means of an installation such as that shown above. A man enters the shaft on the lower floor and immediately is raised to the next floor by means of the pneumatic elevator shown. The entire installation is automatic. Return is made by sliding down a brass tube such as used by firemen.

An explosion in a mine recently claimed numerous miners, but one of the miners owes his existence today to his presence of mind when he grabbed the tail of a mule and was dragged to safety.

In the accident illustrated at the left, one of the miners relied upon an animal instinct which is equivalent to that prevalent in human beings, wherein self-preservation is supposedly the first law of nature. This miner, knowing that one of the mules employed for pulling the cars of ore would get out of the mine if there was any possible chance of doing so, grabbed the animal's tail and was saved.

www.americanradiohistory.com

# Tarrano the Conqueror

TENTH INSTALLMENT

By RAY CUMMINGS

*First American and Canadian Serial Rights*

## CHAPTER XXIII

THE FIRST RETREAT

I MUST recount now what Elza later told me, going back to those moments when Elza sat upon the balcony watching Tarrano and the Red Woman. The significance of what had been transpiring at the Water Festival was not clear to Elza; she did not know what was impending, but as she sat there with Tarrano beside her, a sense of danger oppressed her. Danger which lay like a weight upon her heart. Yet several times she found herself laughing—hilarious; and from Maida's warning glance, and the steadying odor which Maida wafted to her, she knew that Tarrano was using the alcholite fumes to intoxicate her.

The Red Woman and Tarrano were upon the dais. There came a flash; then darkness. Elza went cold with terror. She sat stiff and silent, while around her surged that turmoil of confusion. The smell of chemicals was in the air; her skin prickled as with a million tiny needles where sparks now began to snap against it.

How long she crouched there, or what was happening, Elza did not know. But presently she heard Tarrano's voice in her ear.

"Come, Lady Elza, I must get you out of this." In the darkness his face glowed wraith-like. Then she felt his hand upon her arm.

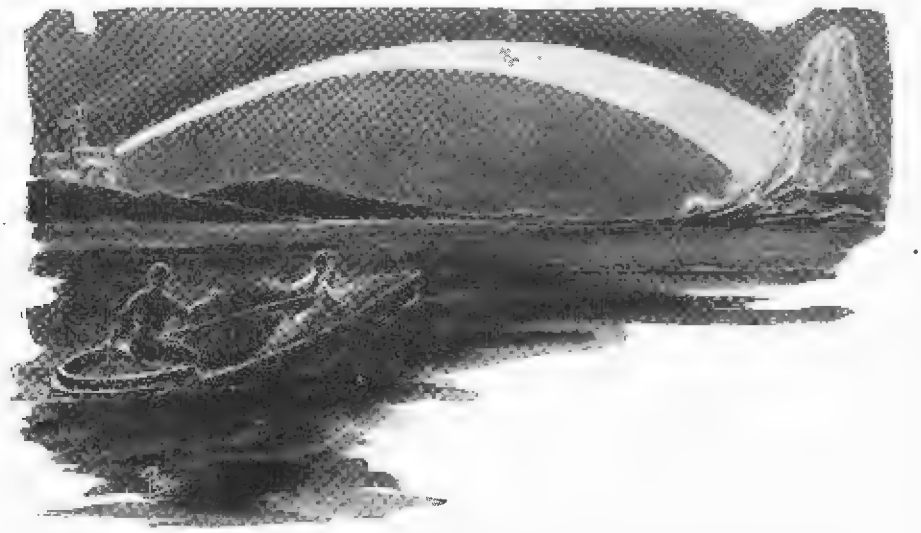
"Come, we must leave here. I would not have you endangered."

With a haste and roughness that belied the calm solicitude of his words, he pulled her to her feet. There was light in the pavilion now. Elza saw dimly the turmoil of struggling figures; and then she saw the scene duplicated—saw it shift and sway in crazy fashion. Though she did not know it, she was looking out along the curved rays which Tarrano was sending from them. Sparks were snapping everywhere. A second image of Tarrano appeared to the left of her—she saw it in a mirror nearby—yet he was at her right, gripping her arm.

"Hurry, Lady Elza."

She found herself being dragged along the balcony; stumbling over a body lying there; feeling a surge of heat and electric disturbance beat against her face. Then Tarrano had her in his arms, carrying her. She heard him curse as a sudden wave of fire seemed to strike them—hostile rays bringing a numbness to muscles and brain. Tarrano was fumbling at his belt; and through a shower of sparks he stumbled onward with his burden.

Elza's senses were fading. Vaguely she was conscious that Tarrano was carrying her down an incline to the ground. Grateful, cool air. Stars overhead. Trees; foliage; shimmering water. . The screams



It swung into the air in a slow, lazy parabola. came down and dropped into the lake. But it fell where the marksman saw the boat, a safe distance to one side. A ball of fire dropping into the water, exploding the water all around it for a distance of a dozen feet.

Then abruptly, upon a table a huge Slaan leaped—his garments blood-stained from his victims, a blade of dripping steel in his hands.

### SYNOPSIS

*N the spring of the year 2325, all of the rulers of the various countries of the earth are mysteriously murdered. Jac and Grayson, employees of a large news organization, find that the murders are the result of a plot on the part of the inhabitants of Venus. Tarrano, an erstwhile lower official of the Cold Country of Venus is found to be at the head of a plot to rule the universe.*

*Dr. Brende, a friend of Jac's has discovered a medical method whereby human beings may be kept from growing old. The Doctor is killed by a group of "Venus-Men" and Jac, Elza, the Doctor's daughter and Georg, the Doctor's son, are captured and taken to Venia, a city on the earth inhabited by people of Venus. Here they are imprisoned and Wolfgar, a Venus-man, friendly to the people of the earth, surrounds them by an electrical isolation barrage in an attempt to rescue them. The barrage is broken down and in the resulting confusion, Georg escapes to Washington in company with Princess Maida of Venus.*

*The next day, Tarrano offers to return the papers and models of the invention made by Georg's father, which he has confiscated and brands young Brende as an impostor. To offset this accusation, Georg is to tell his story to the earth as well as to Venus and Mars by radio and helio. He and Princess Maida go to the station but there they disappear.*

*Jac, Wolfgar and Elza, still captives, are removed from their prison and taken to the top of an enormous tower. Here, in the instrument room, where communication with the various planets is held, they view the disappearance of the Princess Maida and Georg by television. The abduction has been done by Tarrano's agents. On Mars, Tarrano's followers are attacking the ruling class and Tarrano offers Dr. Brende's secret to the public if they will surrender to his cohorts. They agree. Tarrano then announces to the earth people, that he will not give them the Brende secret and declares war upon them, challenging them to attempt to conquer him.*

*The air war vessels of the earth government start to attack Venia, but Tarrano sends up a bomb of surrender and then, with Elza, Jac and Wolfgar, he escapes through an underground passageway to a space-flyer. They go on board and are taken to Venus to where Georg and the Princess Maida have previously been transported. They are royally welcomed and go to the palace of the Princess Maida. Here they are attacked by Argo, one of Tarrano's men, who shoots a violet-colored beam of light across the room, separating Maida from the rest of the party. He threatens to kill her, when suddenly Wolfgar throws himself into and through the violet beam of death.*

*Wolfgar dies soon after he confesses to Maida that he loves her and Maida has made a similar declaration. With great pomp and ceremony, the body of Wolfgar is laid to rest in the WATERS OF ETERNAL PEACE.*

*The evening after the burial of Wolfgar, Jac chances to be alone in a small boat near the palace and he is warned by a "slaan," a Venus man, to guard himself well. He also sees below the surface of the water and encased in a diver's cap, the face of an Earth man. Later that evening, preparations are rushed through for the great Water Carnival of Venus and to it proceed Georg and Maida; Elza and Tarrano; and Jac without a partner. They disguise themselves with long robes and masks and soon reach the scene of the festival.*

*At the carnival all of the inhabitants of the planet are seemingly given over to the pursuit of pleasure and love. However, there is a vicious undercurrent of events noticeable to Jac but which does not seem to claim the attention of Tarrano. At one place there is a swimming pool in which girls are constantly sporting themselves. Watching them, Jac sees one of them drag a Tarrano guard to the edge and with him grasped in her arms, plunge into the pool. A few seconds later the girl comes to the surface but the man is never seen again.*

*Toward the climax of the celebration, a notorious Venus character, the Red Woman, performs a dance particularly for the benefit of Tarrano. In the midst of it, the large hall in which it is being held, suddenly is darkened and rays of death shoot out over the place. Jac, forewarned, drops to the floor out of their range and throughout the entire assembly, "slaans" in the employ of Princess Maida wreak havoc with their long knives. The cry goes up, "Down with Tarrano. Loyalty, everyone, to your Princess Maida." The Venus people, followers of Maida, have revolted; the Red Woman is dead, but Tarrano—?*

www.americanradiohistory.com

and confusion of the pavilion growing fainter. . . .

When Elza regained consciousness, she was lying in the bottom of a little boat, and Tarrano was sitting beside her.

"So? You have awakened? We are quite safe, Lady Elza."

She and Tarrano were alone in the boat. It was long and very narrow, with its sides no more than a foot above the water. Tarrano sat at its chemical mechanism. A boat familiar to us of Earth. A small chemical-electric generator. The explosion of water in a little tank, with the resultant gases ejected through a small pipe projecting under the surface at its stern. The boat swept forward smoothly, rapidly and almost silently, with a stream of the gas bubbles coming to the surface in its wake.

"Quite safe, Lady Elza."

She saw that Tarrano's face was blackened with grime. His garments were burned, and hers were also. He was dishevelled, but his manner was as imperturbable as ever. He made her comfortable on the cushions in the boat; drew a robe closer around her against the rush of the night air.

Elza was unhurt. She saw now, with clarifying senses, that they were plying along a narrow river. Banks of foliage on each side; the auroral lights in the sky; occasionally on the hillsides along the river, the dim outlines of a house.

It was all a trifle unreal—like looking through a sunglass that was darkened—for around the boat hung always a vague pall of gloom. Tarrano spoke of it.

"Our isolation barrage. It is very weak, but the best I can contrive. From these hills the naked eye, now at night could hardly penetrate it. . . . A precaution, for they will be searching for us perhaps. . . . Ah! . . ."

A white search-ray sprang from a house at the top of a hill nearby. It leaped across the dark countryside, swept the water—which at that point had broadened into a lagoon—and landed upon the boat. It was a light strong enough to penetrate the barrage—the boat was disclosed to observers in the house. But Tarrano raised a small metal projector. A dull-red beam sprang from it and mingled with the other. A surge of sparks; then Tarrano's red beam conquered. It absorbed the white light. And Tarrano's beam was curved. It lay over the lake in a huge bow, bending far out to one side. Yet its other end fell upon the hostile house. The white search-ray from the house was submerged, bent outward with Tarrano's beam. From the house, the observer could only gaze along this curved light. He saw the image of the boat—not where the boat really was—but as though the ray were straight.

Elza, staring with her heart in her throat, saw a ball of yellow fire mount from the house. It swung into the air in a slow, lazy parabola, came down and dropped into the lake. But it fell where the marksman saw the boat, a safe distance to one side. A ball of fire dropping into the water, exploding the water all around it for a distance of a dozen feet. Like a cascade, the water mounted.

Tarrano chuckled. "A very bad marksman."

Other bombs came. It turns me cold when I think how orders like this could have come from the Great City—these bombs which had they found their mark would have killed Tarrano, but at the expense of the life of Elza. They did not find their mark. Tarrano continually changed the curve of his beam. The image of the boat shifted. A few moments only; and riding the waves of the bomb-tossed water, they rounded a bend, back into the narrow river and were beyond range.

Tarrano snapped off his ray. "Quite safe, Lady Elza. Do not be alarmed. I doubt if they will locate us again. They should be very busy now in the Great City. I'm surprised they could even think to notify this Station we have just passed."

We were indeed very busy in the Great City during those hours, as you shall presently hear.

Tarrano and Elza were not again disturbed. How far they went in the boat she does not know, but at last they landed in a sheltered cove. An air vehicle was there. Tarrano transferred Elza to it, and in a moment more they were aloft.

The vehicle was little more than an oblong platform, with a low railing. A platform of a substance resembling *glascite-transparent;* and with a *glascite* shield V-shaped in front to break the rush of wind and yet give vision. A mechanism, not of radio-power, but of gravity like the Space-flyers. Such platforms had been, but were no longer in use on Earth. Elza had never seen one. It was a new experience for her, this flying with nothing above one, nothing to the side, or underneath save that transparent substance. To her it was like floating, and at times falling headlong through the air.

They rose no more than a thousand feet at first, and then swept parallel with the ground. At a tremendous speed; even at this height the forests seemed moving backward as the ground moves beneath a surface vehicle.

Dark, somber forests of luxuriant tropical vegetation. It was now nearing dawn; the auroral lights were dropping low in the sky; the great Venus Cross of Dawn was rising, its first two stars already above the line of hills to one side.

Then the sky out there flushed red; a limb of the glorious Sun of Venus came up. A new day. And even though the air was warm, within Elza was a shiver.

"It is very wonderful to me, my Elza, this being alone with you."

He sat beside her, gazing at her with his calm, impenetrable eyes. It was near noon of that day following their escape from the Water Festival. They had flown possibly two thousand miles. The Sun had risen, but after a time—since their enormous speed and change of latitude had affected the angle at which they viewed it—the Sun now was hanging almost level, not far above the horizon. Hanging level, and turning visually cold.

Beneath the platform—a mile below now—lay a tumbled waste of naked crags. The borders of the Cold Country! Tarrano's stronghold! The birthplace of his dreams of Universal conquest.

Elza was staring downward. A barren waste. Rocks bare of verdure. Grey, with red ore staining them. A desolation of empty rock, with grey flat shadows. And far ahead, the broken, serrated ranks of mountains with rocky peaks, white-hooded with the snow upon their summits. The Cold Country. Bleak; forbidding.

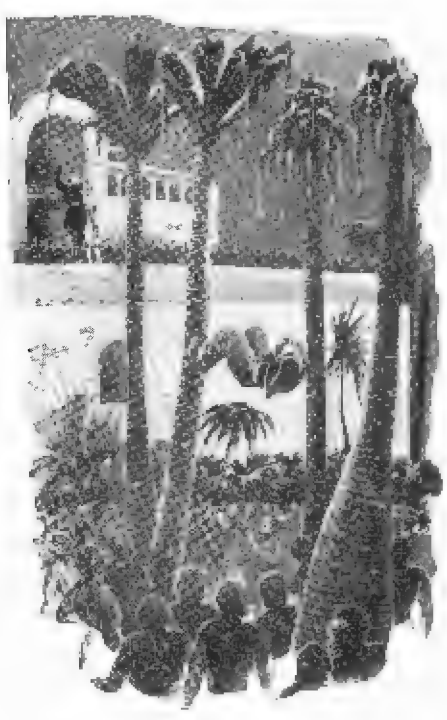
This brittle air was cold; yet Elza and Tarrano were warm. Before the platform, a ray darted—a low-powered ray of a type that was to be so great a factor in the warfare into which we were all so soon to be plunged. It heated the air, so that the platform rushed always through a wind that was balmy.

"What did you say?" Elza looked up to meet Tarrano's steady gaze.

"I said it is wonderful to be thus alone with you, my Elza."

"Oh." She looked away.

(*Continued on page* 1136)



**And then the sudden condensation brought snow—a thick white fall of it sifting down . . .**

**The arctic! It was nothing like the Polar regions of Earth. Stark desolation. A naked land seemingly upheaved by some gigantic cataclysm of nature, lying tumbled and broken where it had fallen in convulsive agony; and then congealed forever in a grip of ice.**

www.americanradiohistory.com

# MAGIC By "DUNNINGER"

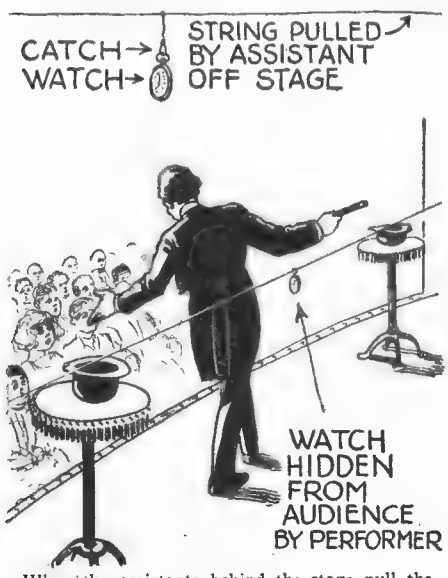
## THE MAN WHO MYSTIFIED

Pres. Coolidge
Prince of Wales, Ex-President Harding, Taft, Roosevelt, and other celebrities
Writes Exclusively for
SCIENCE AND INVENTION

Folks Are Mystified Yet Delighted by This Man!
Mind You! The Mind Reader Really Read the Mayor's Mind
DUNNINGER DRAWS MORE BIG CROWDS
Dunninger Will Attempt To Hypnotize Patient, 10 Miles Away, by Radio

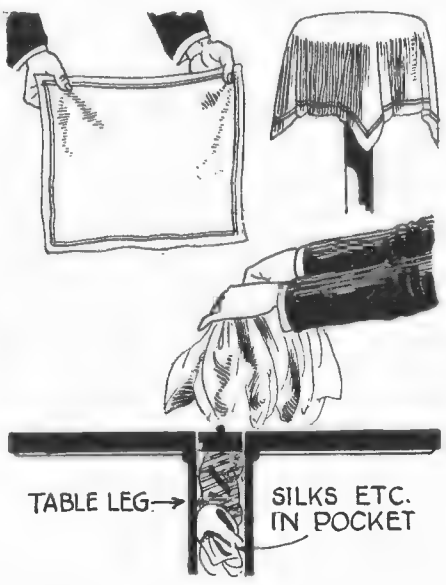
NO. 37 OF A SERIES

Invisible Transportation: In the diagram below the method of making an object pass from one hat on one side of the stage, to another hat on the opposite side of the stage, is clearly illustrated. The magician drops a watch or other object into one hat, taking care that it is hooked to the thread. Under cover of his body the watch is then transported to the other hat.



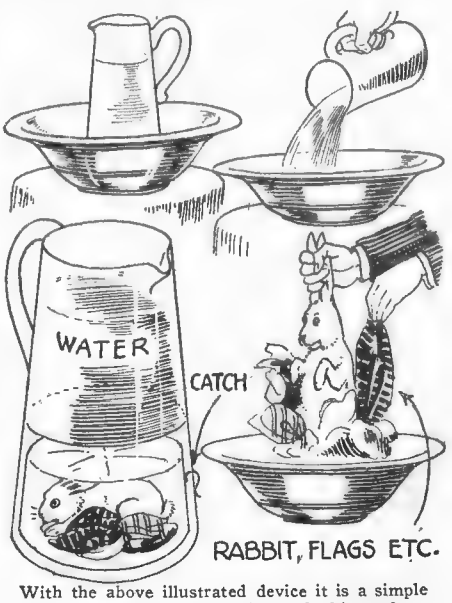

When the assistants behind the stage pull the string, the watch may be made to pass from one hat to the other under cover of performer's body.

Handkerchief Production: In the diagram illustrated below the magician employs a unique end table, which contains a pocket in its single supporting leg. Silks are pushed down into this pocket after having been securely fastened to the small cap covering the hole. Then he places one silk kerchief over the table and grasps it in the center, he pulls the load away with him and produces it.




Above is illustrated a clever method of securing a load from an end table.

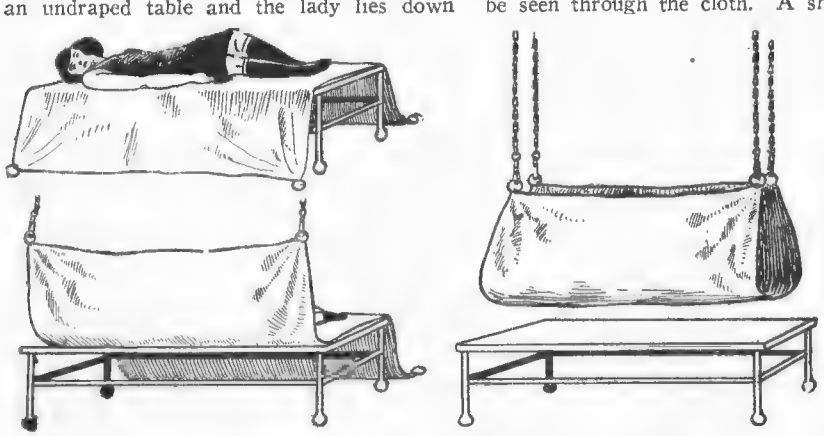
The Water Pitcher Load: A pitcher of water is seen standing in a wash basin as illustrated below. Water is poured from the pitcher and immediately thereafter a rabbit, flags and silks are produced from the basin. No table traps are used. Notice that the pitcher contains a compartment in the bottom which houses the load. The water is poured outside of the compartment.

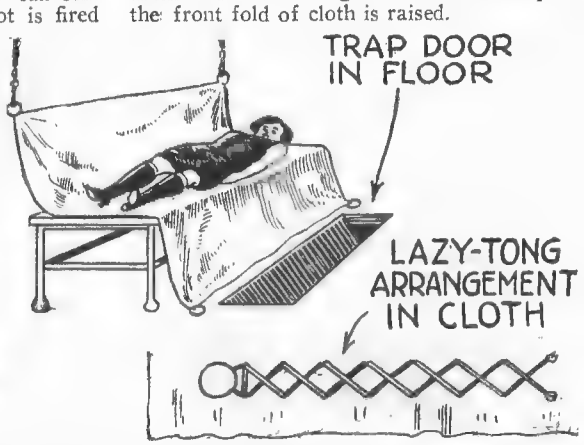



With the above illustrated device it is a simple matter to produce a variety of things from a pitcher and basin of water.

# The Disappearing Lady

Below we see a very interesting method of making your female assistant disappear. The effect is as follows. A cloth is laid over an undraped table and the lady lies down upon the same. The front and back ends of the cloth are then raised clear of the stage and the outline of the girl's body can still be seen through the cloth. A shot is fired and the cloth collapses and drops to the stage floor, the girl having completely disappeared from mid-air. The girl rolls into a trap as the front fold of cloth is raised.






The girl lies down on an undraped couch which has been covered with a cloth provided with rings as shown. The front is raised and then the back follows. Apparently the girl is still within the cloth. As a matter of fact she disappeared into the trap. The lazy tong arrangement in the cloth makes the audience believe that the girl is still concealed within the suspended sack. This tong is collapsed when the cloth is permitted to fall.

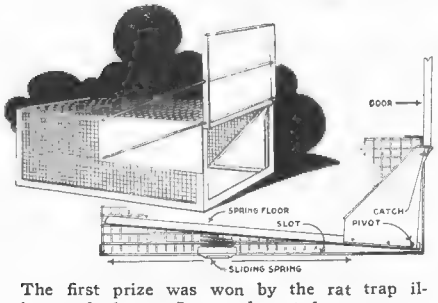
www.americanradiohistory.com

# Rat Contest Awards

The above photograph shows how rats are being exterminated in some of the foreign countries. This particular picture shows a professional rat catcher. The tank on his back contains poison gas, a hose connecting from the tank is pushed down into the rubbish and then the bellows on top of the tank is actuated by means of a lever in the user's right hand. This gas means instant death to the rat pest.

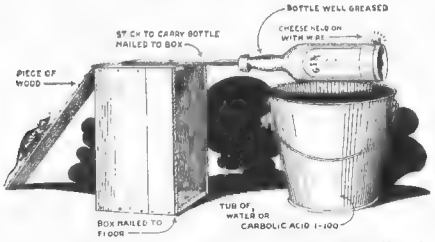
The photo at the right shows four professional rat catchers and some of the victims. The gas acts upon the rats instantaneously halting them in their paths and immediately killing them.

In the original announcement of the rat exterminating contest, the editors made specific mention that they desired new systems for killing rats. No consideration, therefore, was given to those old chestnut methods, as for instance, sprinkling grain of any kind on water and the rats in attempting to get at the grain will naturally fall through the layer and drown. Feeding the rats plaster of Paris or cement in any food mixture is also very old. Let us see how the judges assigned the $250.00 in awards.




The first prize was won by the rat trap illustrated above. It may be set for any number of rats by changing spring position.

First Prize $100.00—was awarded to J. Albin Hedberg of Chicago, Ill., for the construction of the trap illustrated above. By changing the position of the sliding spring beneath the floor the tension for the release of the door may be varied, so that the weight of one or seven rats closes the door.


BOTTLE WELL GREASED
STICK TO CARRY BOTTLE NAILED TO BOX
PIECE OF WOOD
BOX NAILED TO FLOOR
TUB OF WATER OR CARBOLIC ACID 1-100

A greased bottle suspended over a pail of water and fitted with bait, as illustrated above won the third prize.

Second Prize, $50.00—was won by Gregory Bowden of San Luis Obispo, Calif., for the suggestion for poisoning rats using an egg as bait. It is a well known fact that rats like eggs and they will carry those eggs down into their nests to feed their young upon the contents. A tiny hole is pricked in the egg and poison is pushed into the hole. The hole is then sealed with a piece of tissue paper. The egg is placed where rats will easily get at it. The poison does the rest.

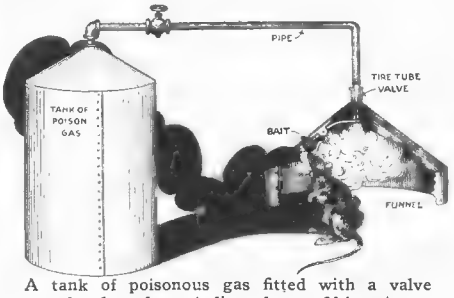
Pricking a tiny hole in an egg and then inserting poison and again resealing the hole is the second prize winning suggestion.

Third Prize, $30.00—was won by Frederick C. Jones, of Woollahra, N. S. Wales. He takes an ordinary round bottle, mounts it on the end of a stick nailed to a box, and then greases the bottle well. A piece of cheese or other bait is then fastened to the bottle by means of wire. A runway is then fitted to the box and a pail of water placed under the bottle as shown. The rats in attempting to get at the bait lose their footing on the bottle and fall into the water to drown.

Fourth Prize, $25.00—was awarded to R. D. Rabenold of Hillsboro, Iowa, for the method with which he was able to rid his farm of these pests. He merely painted stripes across the rats, as illustrated, and released the rats again. Such painted rats are not welcomed by their brothers and the other rats will soon disappear from the premises.

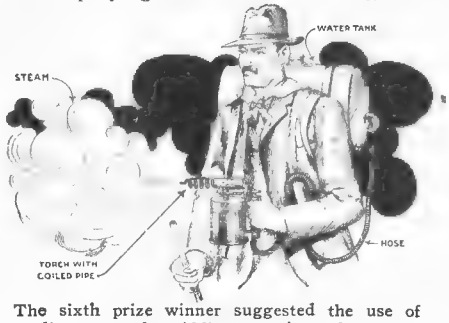
Catching the rat alive, painting stripes upon its body and releasing it wins fourth prize.

Fifth Prize, $20.00—was won by John G. Dengler, of Pittsburgh, Pa., for the poison gas system here illustrated. When the rat pulls down on the bait, the valve is opened and the rat is killed.



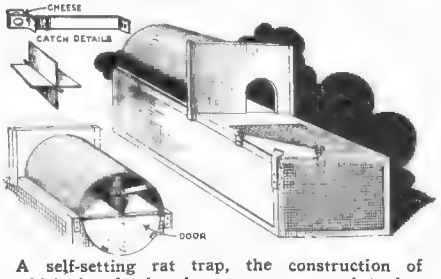

A tank of poisonous gas fitted with a valve and released as indicated got fifth prize.

Sixth Prize, $15.00—was won by Juan P. Stoddart of Arica, Chile, for this idea. There is no danger to any merchandise nor any fear of starting a fire. Four men starting from four corners of a plot work to a common center spraying live steam on the ground.




The sixth prize winner suggested the use of live steam for ridding premises of rats.

Seventh Prize, $10.00—was won by T. Sheley of Indianapolis, Indiana, for the rat trap illustrated below. This is a self-setting trap which catches the rats alive. When the rat nibbles at the bait he releases the floor beneath him which precipitates him into the lower compartment, turning the door through an arc of ninety degrees and resetting it.




A self-setting rat trap, the construction of which is clearly shown, won seventh prize.

www.americanradiohistory.com

# MODEL DEPARTMENT

## Win a Silver Trophy Cup

### Take up "Model Making" as a Hobby. It is Interesting, Instructing and Profitable. Submit Your Results to Us and Compete for the Handsome Engraved Cup Illustrated Below.

THE Model Department is here at last! Due to popular request, we have decided to incorporate a Model Department in this magazine and as a further inducement to our readers to build models and to submit them for publication, we are offering a prize of a handsome silver loving cup for the best model submitted each month. Once you have won this cup, it is yours to keep. There is no necessity for you to win it two or three times in succession as is often the case in contests where cups are awarded as prizes.

Here is shown a photographic reproduction of the cup that will be awarded each month for the best model submitted. Isn't it worth working for? It is 17½" high and weighs five pounds.

On the two following pages of this issue you will find complete details covering the construction of one of the finest working models of a steam engine and boiler we have seen in some time. This is an example of the kind of work that we want to encourage among our readers. The building of models is a hobby that is wide spread and you will find followers of it in every class and creed throughout the world. You need not have an elaborate machine shop in order to compete in our contest as some excellent models have been made with the very simplest of tools.

After you have viewed the drawings accompanying the following article, do not presume that you have to make similar drawings in order to enter your model. On the contrary, the simplest of detailed sketches will suffice. However, your model must be submitted and from it and from the sketches that you send, our artist will make up drawings that can easily be followed by anyone. So, the work that you do, will benefit the other readers of SCIENCE AND INVENTION as well, providing that your design is published. By working hard and turning out the best possible model, you will accomplish many things. First, you will be instructing yourself in some certain lines of endeavor. Secondly, you will be acquiring a knowledge of tools and how to handle them to the best advantage. Third, you may be helping others to enter this most fascinating of all pastimes. Fourth, and last but by no means least, you will be paving the way for competition in a contest that may net you a handsome silver trophy cup as a reward for your labors.

In the center column of this page, you will find complete rules for entering our Model Contest. Study them carefully and follow each and every one of them. If you abide by the rules, your entry can be handled quicker when it reaches this office and if it is awarded the prize, we can present it to our readers in the best possible form. Do not forget the main thing and that is that the model itself must be submitted. Remember the Model Engineers of today are the fullfledged engineers of tomorrow. Model building is the stepping stone to engineering if you elect to make it worth your study and thought.

### Rules for Model Contest

1. A handsome silver loving cup engraved with your name, will be awarded as the prize for the best model submitted during the month. The decision of the judges will be final and will be based upon, A—novelty of construction; B—workmanship; C—operating efficiency of the model as related to the efficiency of the device which the model simulates, and D—the care exercised in design and in submitting to us sketches and other details covering the model.

2. Models of all kinds may be entered. They may be working models or not, according to the subject that is being handled.

3. Models may be made of any available material, preferably something that is cheap and easily obtainable. Models made of matches should not be submitted to this department but should go to our Matchcraft Contest Editor.

4. Models must be submitted in all cases. Good photographs are also highly desirable and where the maker does not desire the model to be taken apart, legible drawings with all dimensions covering parts that are not accessible must be submitted.

5. Models should be securely crated and protected against damage in shipment and sent to us by parcel post, express or freight, prepaid. Models will be returned when requested.

6. Models for entry in any particular contest must reach this office on or before the 25th of the third month preceding date of publication. For instance, models for the June contest must reach us on or before the 25th of March.

7. Address all entries to Editor Model Department, c/o Science and Invention Magazine, 53 Park Place, New York City.

The comparative size of this beautiful trophy cup can be seen in the above photograph. This is a prize that you will be only too proud to show to your friends as proof of your ability as a model maker.

This illustration shows in detail the appearance of the shield that will be engraved on each cup awarded. The winner's name will be engraved in the blank space shown.

www.americanradiohistory.com

# Model Boiler

**Details of The Construction of the Boiler For the Complete Stationary Steam Engine.**

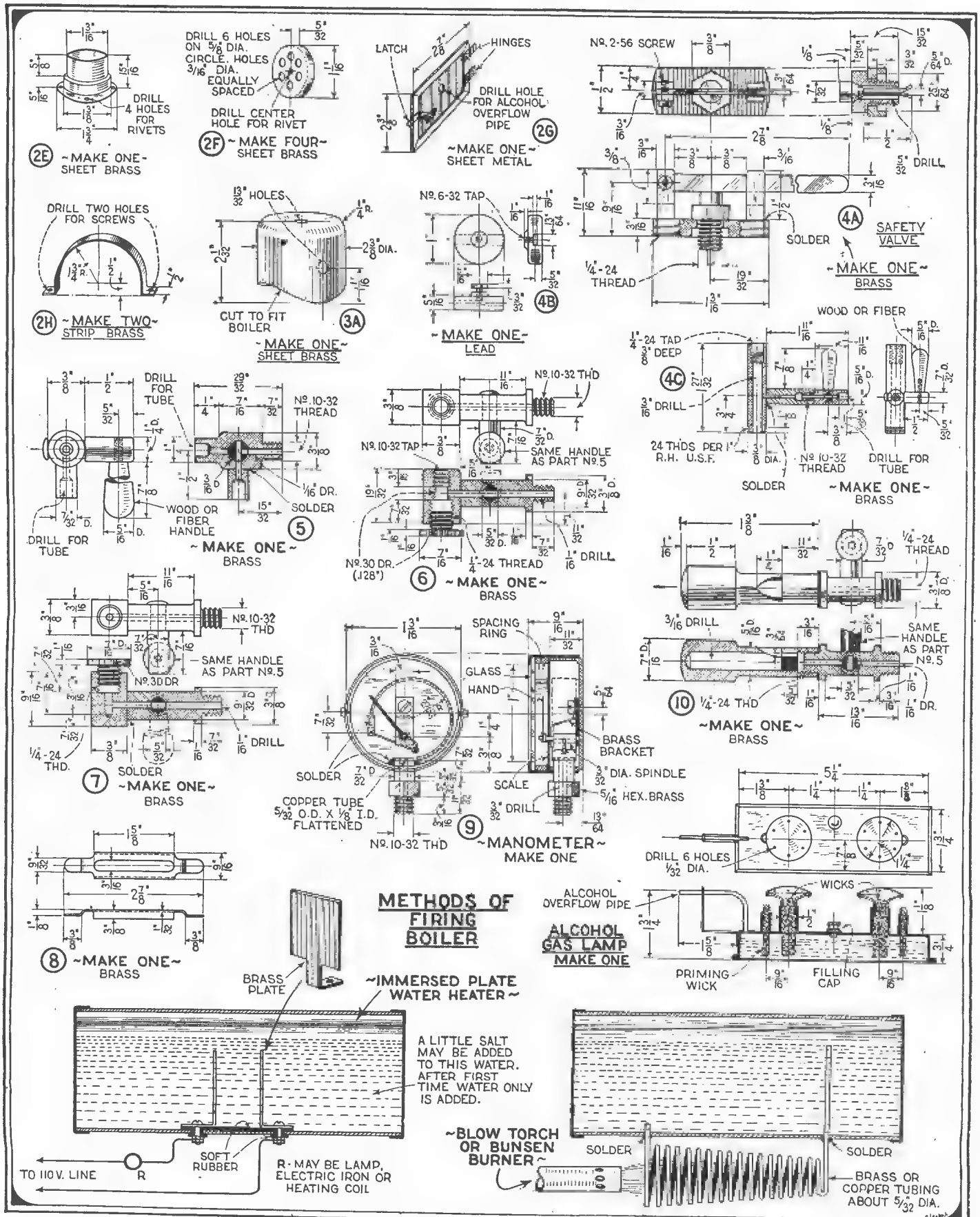
**Illustrated in the March Issue. This Is the Second and Final Installment**

IN the last issue of SCIENCE & INVENTION Magazine we showed the complete details of a model steam engine developing 1/30th of a horsepower with steam at a pressure of only fifteen pounds per square inch. The remaining details for the construction of the boiler are listed on this and the following page. The diagrams are explanatory in themselves and every detail can be seen in the illustrations in this issue as well as those in the previous issue. The pipe connecting with the boiler to the cylinder of the steam engine should preferably run along the side of the boiler and as near to the fire box as possible, as the photograph in the previous issue showed. In this way additional heat is made to act upon the steam and a sort of a super-heated effect is produced. A small oil cup is preferably inserted into this pipe line so that the moving parts of the valve can be lubricated by merely permitting the oil to pass down into the pipe line. It may also be seen in the photograph published in the March issue that the pipe line slants downward toward the cylinder of the engine. In this way pockets that catch condensed water vapor are eliminated. The pump for the steam engine is unique in construction and not only serves the purpose of pumping cold water into the boiler, but may be used to supply water pressure for a small table fountain or for a small fire hose. In the front end of the boiler a valve will be noticed, the lever of which when turned up permits the water from the pump to be injected directly into the boiler. When the lever is turned forward water from the boiler flows out, thus partly draining the boiler, and when the lever is turned down, water from the pump passes out of the pet cock near the boiler. In this way either hot or cold water can be supplied at will and the boiler of course can be automatically filled up while the engine is running.

? ? ? 

# Stationary Steam Engine Details

## Unique Methods of Firing the Boiler

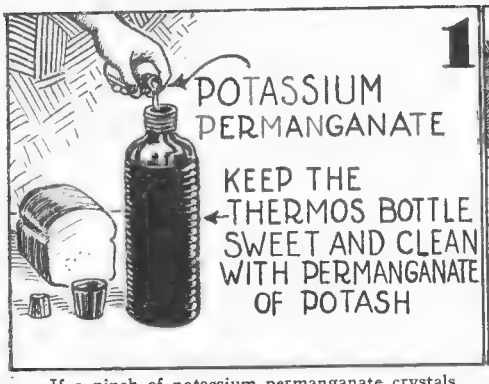



The above print completes the detail diagrams for the model stationary steam engine developing one-thirtieth of a horsepower with only fifteen pounds of steam pressure in the boiler. This model may be made to drive a small dynamo or may be made to operate a small model pumping station or in fact it can be employed wherever one desires to use a miniature steam engine to operate a display of any nature. At the bottom of this page two optional methods of firing the boiler are illustrated. In the electrical system when the water in the boiler gets low, current no longer passes across the plates, and consequently there is no danger of ever overheating the boiler. In the method using the blow torch, heat and high pressure steam are rapidly obtained. As a matter of fact in this particular form of firing, the model can be started, a minute or so after the torch has been ignited. Blueprints for the complete construction of this model steam engine may be had from the Blueprint Division of the Model Department.

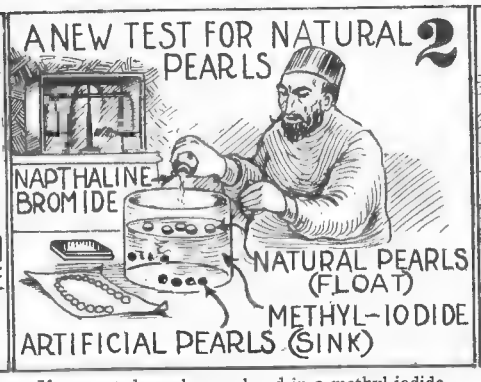
www.americanradiohistory.com

# Everyday Chemistry

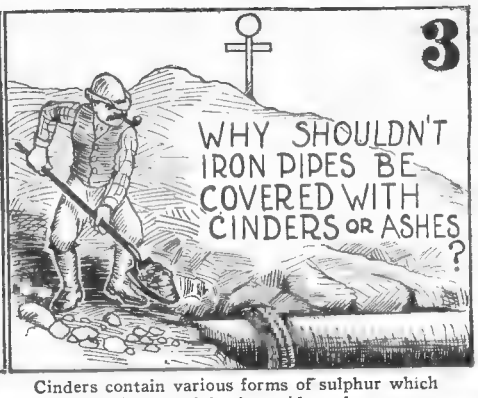
By RAYMOND B. WAILES




If a pinch of potassium permanganate crystals are placed in a thermos bottle and a few ounces of water are added, the mixture will thoroughly clean the interior of the bottle.

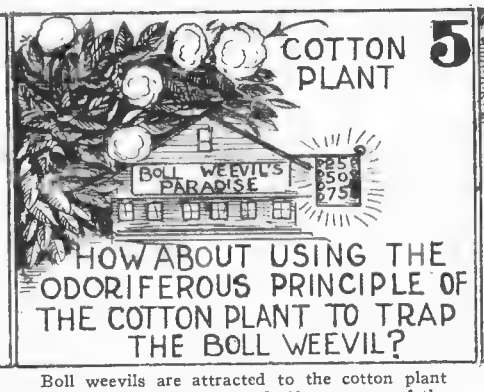



If suspected pearls are placed in a methyl iodide solution and napthaline bromide added, the natural pearls will float, whereas cultivated ones will fall to the bottom.

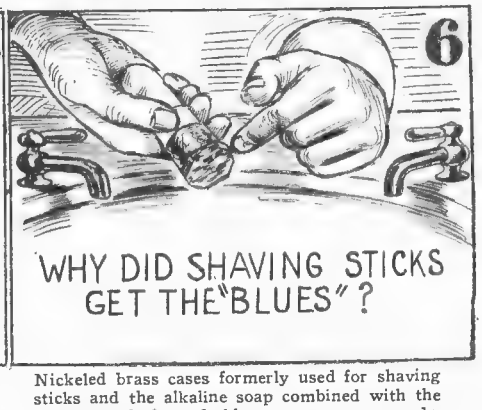



Cinders contain various forms of sulphur which probably form sulphuric acid and cause a rapid corrosion of the iron pipes. Do not use cinders for the purpose shown above.

Picric acid, used as an explosive and as a yellow dye is a very good application for burns and scalds. Made into solution with water, it is applied with bandages.

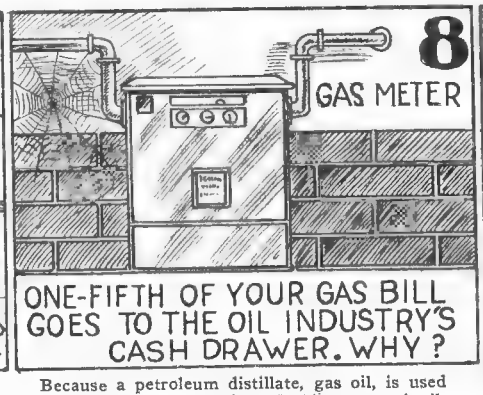



Boll weevils are attracted to the cotton plant by the trimethylene, an odoriferous part of the plant. This substance could be used as a lure for boll weevil traps in the fields.

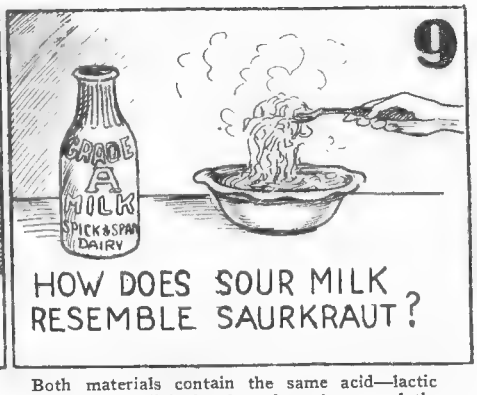



Nickeled brass cases formerly used for shaving sticks and the alkaline soap combined with the copper and formed blue copper compounds. Now, aluminum cases are employed.

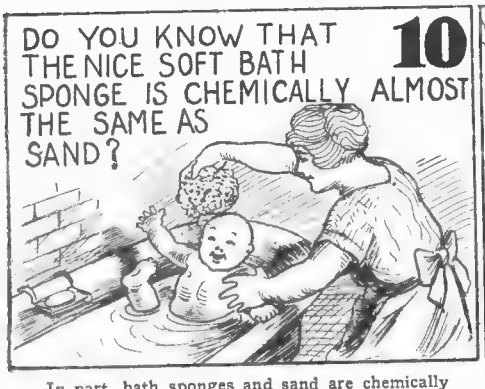
To test this, pour a little of the alcohol into a flat tin pan as above and ignite it. If much liquid residue remains, the alcohol has been diluted maliciously with water.



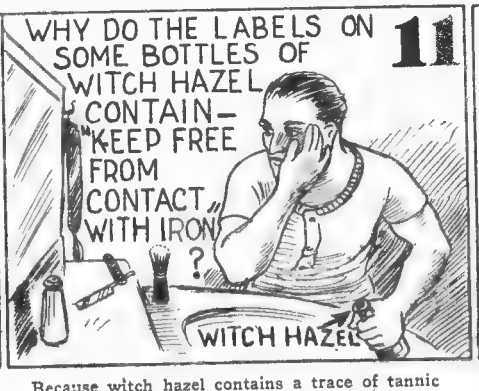

Because a petroleum distillate, gas oil, is used in making the majority of this country's illuminating gas. Therefore, you have to pay for the oil from which your gas is produced.



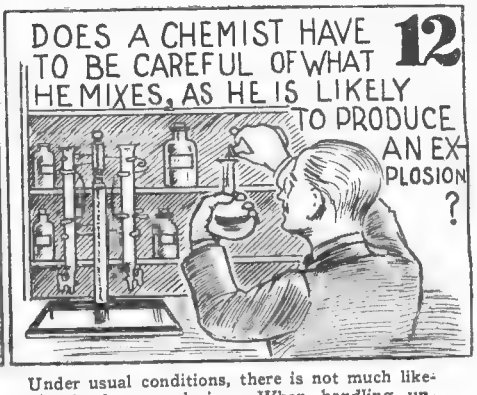

Both materials contain the same acid—lactic acid. The medicinal value of saurkraut and the liquid in which it is cooked is beginning to come into its own.




In part, bath sponges and sand are chemically the same. They are both composed partially of silica although they are entirely different in formation.

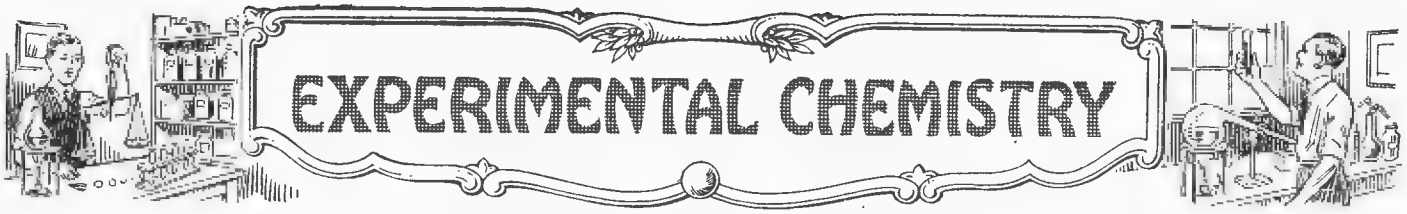



Because witch hazel contains a trace of tannic acid, which in the presence of iron forms iron tannates which are, in reality, the base of many writing inks.




Under usual conditions, there is not much likelihood of an explosion. When handling unfamiliar materials, it is wise however to exercise ordinary safety precautions.

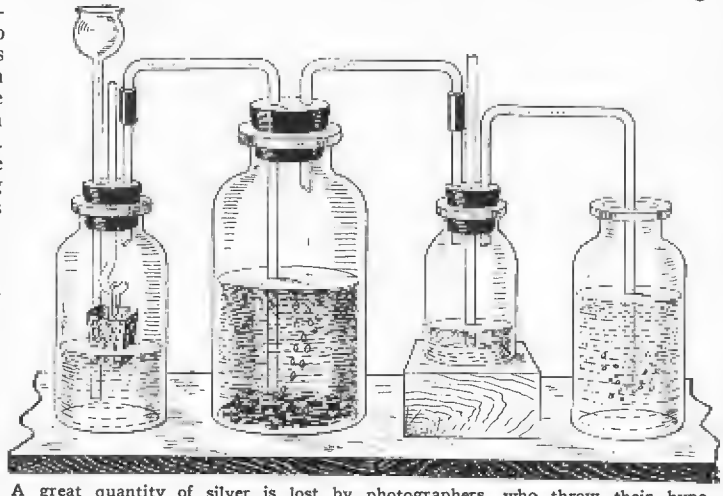
www.americanradiohistory.com




# Recovering Silver From Hypo

A LARGE number of amateur photographers develop and fix their own negatives and prints. In the fixing solution of both negatives and prints quite a little silver is dissolved which is almost invariably thrown away.

The old hypo solutions are poured into a quart or gallon jug and retained until the bottle is practically full. The amount of silver obtained from even a quart of old exhausted fixing baths will surprise the photographer and the resulting silver nitrate can be used for quite a number of photographical experiments, or can be disposed of in other ways. That it does pay to save this solution has been strikingly illustrated in the moving picture industry, where enterprising men went out and collected old hypo baths in order to extract the silver from them. A fortune has been made by this means and now the old hypo baths are not given away, but sold at a good profit.



A great quantity of silver is lost by photographers, who throw their hypo solutions away after use. It can be readily recovered and saved by precipitation with sulphuretted hydrogen as shown above.

The easiest method to extract the silver from hypo by the home worker is to precipitate it as silver sulphide by means of hydrogen sulphide gas which can readily be produced in a special flask; the disagreeable odor given off by this gas can be "caught" in a dilute solution of caustic soda so that no odor is connected with the process.

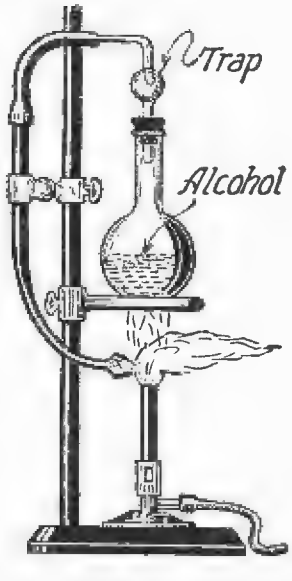
The hydrogen sulphide is generated with iron sulphide acted on by dilute sulphuric acid in a bottle which is stoppered with a rubber stopper having three holes. One hole carries a safety tube, another a gas outlet tube, and the third carries a solid glass rod holding a leaden basket which contains the iron sulphide which may be raised from or lowered into the acid as desired.

When the basket is lowered into the acid, the gas is generated and is passed into the bottle containing the old hypo solution. This bottle is stoppered with a cork having two holes, one containing the tube which leads the gas into the solution, and one which leads out of the bottle and into a little glass containing a dilute solution of a caustic such as lye or in simpler fashion out of the window. This last tumbler absorbs the gas as it passes out and prevents the odor of the hydrogen sulphide generated from entering the room.

After running about an hour the flask containing the hypo will smell of the hydrogen. Then filter the solution, which is now black, through paper; take the paper with its black mud and place it in a beaker containing a strong solution of nitric acid. Boil the paper and the black silver sulphide until the entire mass has a straw color. Then filter again to remove the fibres of the filter paper and evaporate. This resulting silver nitrate is collected, and when a small bottleful has been obtained, it can be purified by fractional crystallization and you will have a nice quantity of silver nitrate.

# Extemporized Blast Lamp

The illustration shows an extemporized blow-torch for use in the laboratory, but it should not be used except by a competent chemist, one who is sure of himself. The illustration tells the story. A Pyrex flask, preferably a round bottom one, is placed on a sand bath over a Bunsen burner. From its neck a glass tube leads down to the top of Bunsen burner, perhaps half an inch above it and a little to one side. The clamp which holds the tube will steady the flask. To secure pure gas, vaporized alcohol free from liquid, a trap of simple construction is used immediately above the cork; the illustration shows its simple construction.




A simple blow-torch where the fuel or rather part of it supplies the blast. It should only be used by the practised chemist.

Now on heating the alcohol with the burner placed as shown it soon begins to boil and gives off vapor at a slight pressure to start with, which may become considerable, for a few inches is high pressure in a gas lamp. The blast from the end of the tube deflects the flame and by shifting the burner about various jets can be readily produced. Enough of the heat is supposed to rise against the flask to maintain its temperature high enough to volatilize the alcohol.

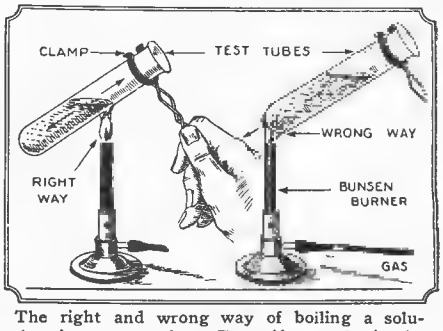
It is the reverse of the ordinary blast lamp, as the fuel or part of it produces the jet.

# Test Tube Breakages

No doubt, the experimenter has often been alarmed at the very large number of test tubes which have been broken in his laboratory. An inquiry will reveal that a large proportion of them are broken when being used to heat a liquid or substance over the Bunsen burner.

Referring to the "wrong way" in the two sketches herewith, it will be seen that the extreme closed end of the test tube is being heated. This will cause steam bubbles to form, which will push the overlying liquid in the direction of the arrows, to L and also to B. It will be seen that B is the end of the tube and the bubbles bring the unprotected glass into the flame, heat becomes so great that the end of the tube by the heat and the return of the water is broken.

Referring to the "right way" as illustrated, it will be seen that the tube is heated near the surface of the liquid or well above the bottom of the tube. Any steam formed here will easily bubble up through the small amount of liquid overlying it and escape into the air of the test tube, the downward pressure being very slight and no breakage occurs. But even at this do not use too large a flame. Now, as the liquid becomes heated to boiling, the tube should be raised in the flame so that the central portion of the liquid is heated and then by another slight elevation the lower contents are heated. It will be found by employing this method of heating, with gentle shaking or swirling of the tube and its contents with a rotating motion of the hand, test tubes will rarely become broken over the flame.




The right and wrong way of boiling a solution in a test tube. Even if you do it the right way do not turn up your gas flame too high.

—*By Raymond B. Wailes.*

www.americanradiohistory.com

ecured: Trade Marks Registered—A comprehensive, prompt service for the protection and
tended, Preliminary advice gladly furnished free on request. Richard B. Owen, 130
f your ideas.
t clients. Booklet of information and
Washington, D. C., or 41-F Park Row, New
ent Attorneys (continued)
1167

# Easy Experime
# C

By Earle R. Ca

ONE of the mos
of modern chemi
The field is especially interesting for the experimenter since many of the experiments in colloid chemistry are exceptionally striking, and are generally capable of being carried out with simple chemicals and apparatus. The most unusual experiments are those involving the so-called gels. These substance, in a sense, are the opposite of the colloid solutions. Colloid solutions consist of extremely finely-divided solid matter suspended in a liquid, while the gel consists of finely-divided liquid distributed through a solid. In carrying out the experiments below, little difficulty will be experienced if the directions are carefully

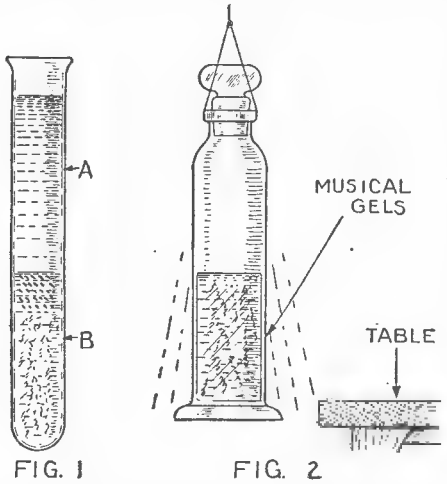



FIG. 1 FIG. 2

Interesting experiments with colloids. Fig. 1 shows overlying gels which may be given different colors. Fig. 2 is a gel whose receptacle gives a musical sound when struck against a table.

followed. The gels as a class are usually sensitive and unstable so that variations in their preparations often result in failure. This very fact, however, makes the field interesting for the real experimenter for lots of room is left for an enormous amount of experimenting in this field.

### EXPERIMENT I
### A MUSICAL OR RINGING GEL

This particular gel is very readily prepared. Commercial water glass is diluted with about an equal volume of water and the solution is then poured into a small bottle or a test tube. With constant stirring concentrated sulphuric acid is then added to the above solution, the number of drops added being equal to the volume of the water glass solution in cubic centimeters. Sometimes the gel forms at once and sometimes the solution will have to be set aside for a day or two. The more dilute the water glass solution, the longer it takes to set. It is much better if several hours are needed to set the gel. The proper point is found by using different dilutions of the water glass solution although with the ordinary product the above dilution is satisfactory. The test tube or bottle containing the preparation when tapped against a wooden bench or similar surface will be found to give forth a clear ringing or musical sound. Successful ringing gels can also be formed with hydrochloric acid and water glass solution. The proper proportions can best be found by experiment. These gels can be kept a long time before they break down or undergo the process known technically as *syneresis*.

### EXPERIMENT II
### BLUE AND RED COLORED GELS

By adding a few drops of phenolphthalein indicator solution to a gel of the kind de-

irst experiment the entire gel
d a red or pink color by the
he indicator. This, however, is
olored gel but only one made so
l means. A gel may be made
er, salts in which the entire body of the gel is of a delicate blue color. An essential point in making this gel is that the solutions must be kept at a low temperature, preferably, under 15° C. (59° F.) which is a little below ordinary room temperature. A simple ice cooling bath will help in carying out this detail. Three c.c. of a saturated solution of copper sulphate are mixed with forty-seven c.c. of a saturated solution of copper acetate. To this mixture are then added with constant stirring four c.c. of ammonia solution, made by diluting the ordinary strong concentrated laboratory reagent with an equal volume of water. The mixture sets to a light blue gel which will not break down from the gel form for nearly a week, if the temperature is kept low. A brown gel from manganese salts may be made by adding three drops of glycerine to twenty c.c. of a six per cent. solution of potassium permanganate. This gel rapidly sets but as a rule only remains in the gel form several hours.

### EXPERIMENT III
### BANDED GELS (LIESEGANG'S RINGS)

A most peculiar phenomena sometimes occurs when ordinary chemical precipitates are formed in gels. Instead of forming in an even mass throughout the solution, as when a precipitate is formed in a water solution in a beaker or test tube, the precipitate in the gel forms in bands, leaving clear spaces between them. These alternate bands are called Liesegang's rings after their discoverer. A simple way of showing them with ordinary materials is to first make up a gel by dissolving two grams of ordinary gelatine in sixty c.c. of boiling water at the same time adding one-twentieth of a gram (one pea-size crystal) of potassium bichromate. The hot solution is poured into a small beaker and allowed to set. When the gel has set it is removed from the beaker and placed in a solution made by dissolving twelve grams of silver nitrate in one hundred and fifty c.c. of water. The cooling and placing in the solution had best be done in an ice box. The gel should be allowed to remain in the silver solution two days. When this has been done the gel is removed with a pair of forceps rinsed with water and sliced thru the middle with a sharp knife. The bands of the precipitated silver chromate can then be readily seen.

### EXPERIMENT IV.
### CRYSTALS GROWING IN GELS

Many substances such as gold, copper and certain salts when slowly formed in gels take the form of beautiful crystals. One of the

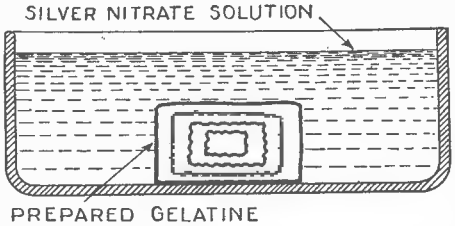


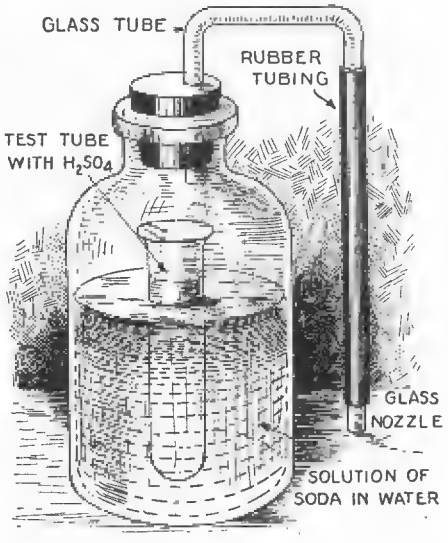

FIG. 3

The illustration shows the method of producing Liesegang's rings. Silver chromate is precipitated in parallel bands, seen by cutting across the gel with a sharp knife.

easiest ways to show this phenomena is by forming golden crystals of lead iodide in silica gel, an experiment that was first performed by Holmes in 1917. This particular growth is strikingly beautiful. Dilute twenty c.c. of commercial water glass to about one hundred c.c. and add an equal volume of acetic acid solution made by diluting six c.c. of the glacial acetic acid to a volume of one hundred c.c. Then add fifteen c.c. of a lead acetate solution, made by dissolving three grams of the dry salt in that volume of water. The mixed solutions are then poured into test-tubes to set. Each test-tube should be about half full. When the gel has set the remainder of each test-tube is filled with a solution made by dissolving thirty grams of potassium iodide in one hundred c.c. of water. The tubes are then observed from time to time. Various fern-like forms appear and the golden-yellow scales sparkle in the light. The proportions of the reagents can be varied within certain limits and variations of the phenomena can be thus observed.

## A Home-Made Fire Extinguisher for the Laboratory

By Frank H. Moore




A chemical fire extinguisher, based on the action of sulphuric acid on sodium bicarbonate. The acid is contained in the test tube.

A FIRE is a thing that we are unable to foretell when one takes a notion to break out. Of course, if care is exercised in the use of it there is little or no danger. However, a fire extinguisher is an invaluable asset to have in the home, and will repay its owner many time, in the feeling of security which it imparts, particularly the experimenter who has a home laboratory and does considerable chemical and electrical work. The one here described is made after the pattern of the well known "Pyrene Extinguisher." As shown in the sketch the requisites are a wide mouthed bottle capable of holding at least a pint of liquid. A saturated solution of sodium bicarbonate (baking-soda), is prepared by dissolving about three ounces of the "soda" in the pint of water. When this has dissolved pour the mixture into the bottle. Now take a test tube long enough to reach almost to the top of the bottle, or so that the top of same will just clear the soda solution when it has been placed in it. Dilute sulphuric acid is now made (1 to 5), and poured into the tube, leaving about one-half inch clearance of the top. A one-hole rubber stopper is fitted with a fairly large bore glass tube bent at right angles, this having a three foot length of rubber tubing connected to it. Assemble the extinguisher by inserting the stopper in neck of bottle, and to use, simply invert the bottle and point the hose at the fire.

The principle of the extinguisher is this—The dilute acid comes in contact with the "soda" solution, which vigorously react chemically, causing a rapid evolution of carbon dioxide gas which forces the liquid out through the tube at quite a high pressure.

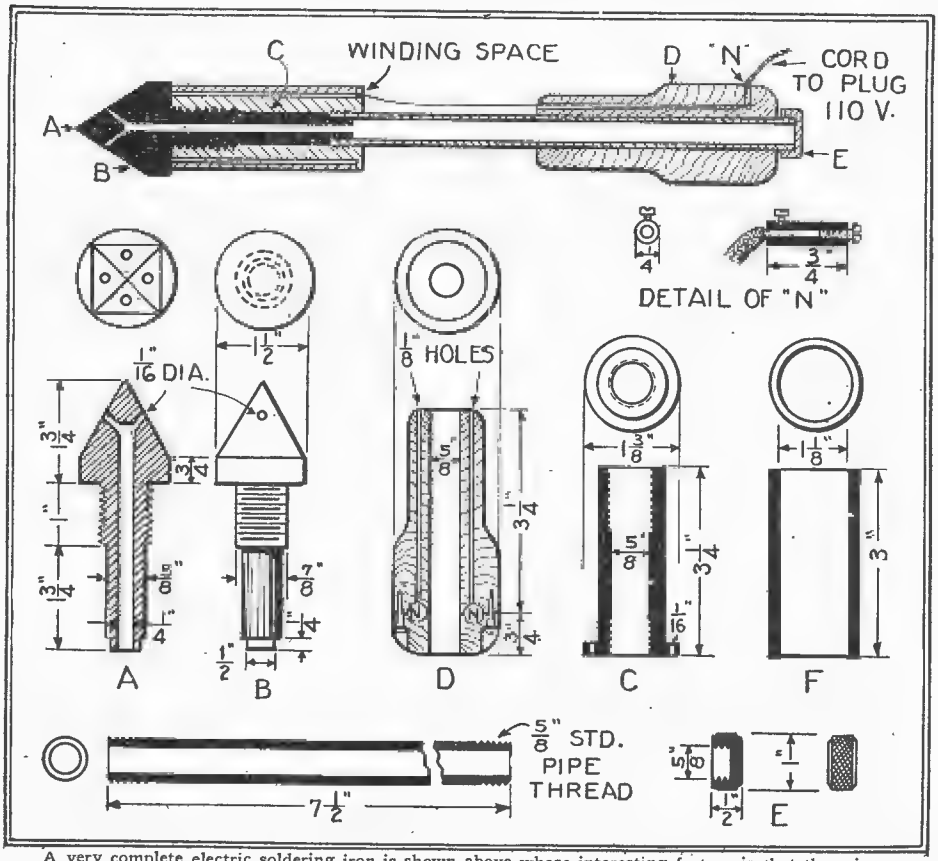
www.americanradiohistory.com

# Magazine Electric Soldering Iron

By A. N. CAPRON

THE electric soldering iron here described and illustrated will at first glance seem to be the ordinary iron, but there are several improvements incorporated in its design. The tubular stem of the iron carrying at one end the heating element and at the other, the wooden handle is used as a magazine for a small stick of solder which is introduced at part E and secured with the knurled cap seen there also. The lower end of the stick of solder comes in contact with the central portion of the copper tip, and when the iron is heated a small quantity is melted and runs out through the fine capillary tubes in the faces of the copper tip, and thereby flows directly upon the work.

It can easily be understood that with such an iron, a larger amount of work can be performed in a given time, as the operator does not have to be continually applying solder to the tip. All dimensions are marked on the sketches.




A very complete electric soldering iron is shown above whose interesting feature is that there is a cavity or reservoir in the bit which holds solder and in which the solder remains melted, coming out as required through a very small aperture communicating with the reservoir.

The heating element consists of two layers of No. 26 nichrome wire wound with 1/32 inch space between turns, an asbestos thread makes a good separator. The form, C, is given a layer of micanite with ¼ inch lap of 25 mils micanite or the equivalent in layers of thinner material, then the nichrome is fastened to the No. 16 enamel wire. The two holes 1/16 inch at base of form, C, are lined with a mica tube and the copper wire is pulled through leaving 10 inches extending outwards, the junction being on the inner end of the former. One layer is wound to ⅛ inch of the end; a layer of micanite 10 mils thick is put over the wire and the winding is continued to the other end (return). A piece of the same wire is fastened to the other end and pulled through the other 1/16 inch hole in the base of C, this hole being previously lined with a small mica tube. The other parts having been made, cover the wound portion with a layer of micanite and try the brass tube, F, on it, if this tube fits too loosely wind a layer of asbestos thread on the micanite to hold it in place and push the tube, F, into position tightly up to the collar on C.

The wrought iron pipe is next threaded and screwed into the lower end of form, C. The copper tip is placed at the other end and screwed tightly. It will be observed that the tube F is held tightly between the flanged ends of part, C, and tip, B. The wood handle is made in two pieces which are to be fastened together with screws or rivets and washers as shown. The lower part 2 is bored with a slight taper at the lower end, so as to grip the pipe, there are also 2 holes in part 1 for the leads from the heating circuit. The ends of leads are fastened to the clip shown at N, a groove being cut on both parts to accommodate this clip. The 110 volt leads are fastened in such a manner, that no live wire emerges from the wooden handle. This is easily accomplished by cutting just sufficient rubber from the wire; the lower part of D when screwed home holds clip and wire leads securely. The addition of the knurled cap, E, completes the iron. But the enamel leads could be better protected by means of a serving of asbestos thread or cord and this asbestos serving protected by winding tightly one layer of No. 10 bare copper wire the end turns of which are to be brazed together with a blowpipe.

The whole assembly is easily repaired and easily taken apart. The size of solder bar recommended is about ¼ inch diameter or wire solder if obtainable will be excellent, this could be cut in pieces 4 to 6 inches long, one filling being sufficient for any ordinary job. If the cap is made a very tight fit it might be necessary to drill a very small hole in cap E to admit air, as if everything is airtight, no solder could flow out at the tip. The size of the almost capillary tube at the tip is given in the sketch as 1/16th inch, but this size is suitable only for tinsmiths. The regular run on soldering work will be better done with a 1/25th inch hole. But this is an easy matter as a few blows around the outer end of the capillary hole will reduce it sufficiently for any special purpose.

Such an iron can be made for $1.25 if the lathe work is done at home. Scrap can be used, the only part which it is absolutely necessary to make out of copper, being the tip or part AB.

# Loud Speaker in Fish Head

By CLYDE E. VOLKERS

SEEKING something new and unique in loud speaker design, the following experiment may be performed successfully:

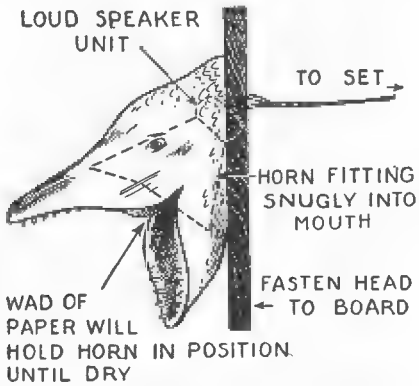
The open mouth of a mounted bass head, the fighting grin of a muscalonge, or any mounted animal head offers opportunities for something new in loud speakers.

If you have no mounted fish head at the time, experiment a little and try to mount one (catch it first). A fish head may be mounted easily. The important points to remember are: to remove excess flesh from the freshly removed head of the fish; to dust the inside of the skull with a mixture of alum and arsenic, 1 part arsenic to 2 of alum; after the eyes have been removed to fill the cavities with artificial eyes of wood, clay or glass, which are made in the natural colors; to prop the mouth open with a stick until the jaws have dried or set; to tack the head to a suitable board by bending the gill flaps at right angles and driving the small tacks through them; to varnish the head after it has completely dried. A trial or two will yield satisfactory results.

The phone rests in a slot cut in the board on which the head is mounted. The cardboard horn is thoroughly soaked in water clamped to the phone, and then while it is soft, and plastic, is pushed against the inner

www.americanradiohistory.com

walls of the head, so as to be invisible. A wad of crumpled newspaper will hold the horn in place until dry, when it will retain its position.


LOUD SPEAKER UNIT
TO SET
HORN FITTING SNUGLY INTO MOUTH
FASTEN HEAD TO BOARD
WAD OF PAPER WILL HOLD HORN IN POSITION UNTIL DRY

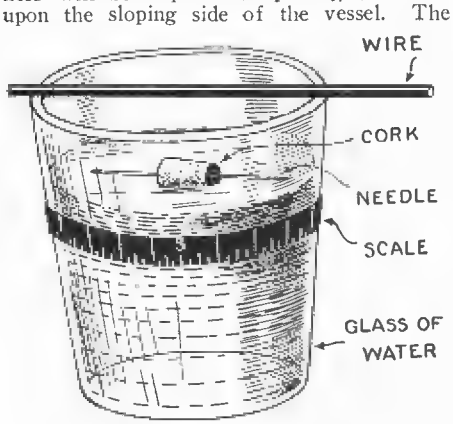
A fish's head nicely mounted on a board serves as the horn, ostensibly at least, of a loud speaker.

The cord should be led to the set in as inconspicuous a manner as possible, the mounted head being hung from the wall.

With the signals coming from the cavernous mouth of the trophy, the program may truly be called—"The voice of the Great Lakes."

## AN EXPERIMENT IN THE ELECTRO-MAGNETIC EFFECTS OF A CURRENT

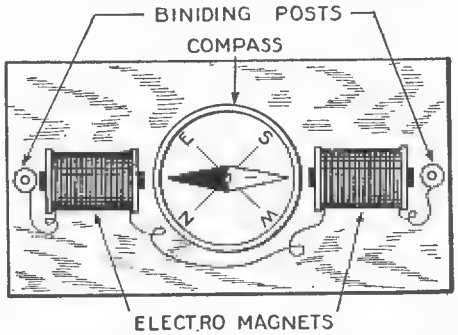
A common sewing needle is magnetized by stroking with a magnet or otherwise and is then thrust through a cork as shown so that it will float in water. In this case a tumbler is used to hold the water. Around the tumbler is pasted a scale marked off upon a strip of paper. A certain amount of niceness will be required in putting the scale upon the sloping side of the vessel. The simplest way is to wrap a sheet of paper tightly around the tumbler, and to spring a rubber band around it, using the rubber band for a guide to draw a horizontal pencil line. On removing the paper it can be cut accurately to this line, and parallel thereto or rather concentric with it is a second cut; this gives a band of paper corresponding to area of two circles of large radius. Putting water into the tumbler and floating a needle upon it, the magnetized needle will point, of course, to the magnetic north. The tumbler is now turned to bring the zero of the scale opposite to the point of the needle. On laying a wire across the top of the tumbler parallel to the needle a slight current through the wire will affect the needle, causing it to turn to right or left, according to the direction of the current. As the needle is frictionless as regards its support, except for the viscosity of the water, which is very slight, we have a most delicate current tester made from the simplest possible appliances.




A rough and ready way of rapidly constructing an extremely delicate polarity tester and an apparatus also adapted for demonstrations.

## CURRENT DIRECTION INDICATOR

A magnetic polarity indicator is illustrated here. This indicates directly the direction of a current or its polarity. The terminals



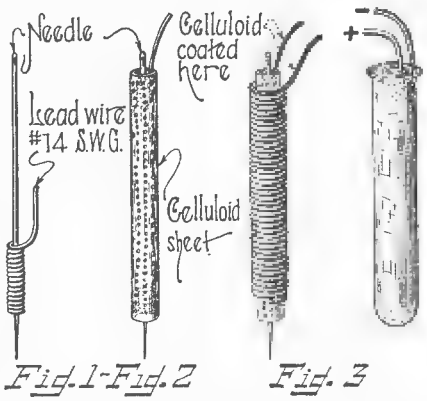

A current direction indicator. This instrument is of quite novel construction, and is a very delicate indicator of current direction as the magnets act so intensely on the needle.

are connected to the binding posts, and the magnetized needle shows instantly the polarity. The instrument is best placed so that the magnetized needle will lie in the magnetic meridian. The magnet windings must be such as to give the direction of current, according to whether the needle points in one direction or the other. There is no half-way variation.

The active portion includes a small compass; there are two electromagnets, facing each other and two binding posts. The pivot of the magnetic needle and magnet cores lie in one line. The needle of the compass must be marked with a + on the proper end to indicate the north pole and with — on the other end. It is inexpensive in construction, and when the poles of the battery, which is to be tested are connected with the binding posts the needle will show the polarity or direction of the current. The constructor must wind the magnets so that opposite poles will face each other when a current passes.

## MINIATURE STORAGE BATTERY

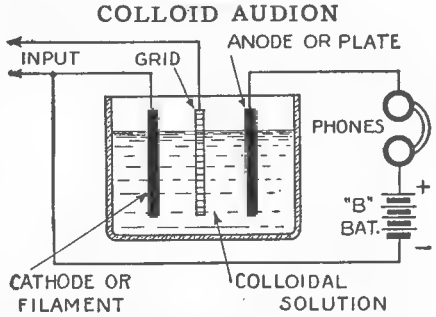
A lead wire No. 14 gauge is coiled around a needle. A piece of celluloid is softened by hot water and wrapped very neatly around




An oddly constructed B battery whose cells are glass test tubes or specimen tubes, and which can be made to give a high voltage by packing a number of the tubes snugly in a box.

the leaden wire. A second leaden wire is wound around the celluloid, this binding everything fast. The needle is then to be removed and it will be seen that here is the element for a storage battery cell ready for the solution. The elements are placed in a test tube or better yet what is known as a specimen tube, which is of heavier glass and acid added. The two terminals are then connected to the charging circuit, charged and discharged over and over again so as to form them on the Planté system. The small box can be packed with a large number of these tubes so as to give a sufficient voltage for a B battery.

## COLLOID AUDION




The above shows the idea of the colloid audion. The colloid rectifier is practical, but so far no success has been had with the audion and the above diagram is given as a suggestion for further experimentation.

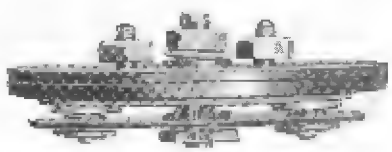
# The Spencer Thermostat Disc

IN Sept. *The Experimenter* described the Spencer invention, a thermostat which operates to produce so sudden an opening and closing of a circuit that the danger of an arc is eliminated, and not only this, but it produces so great a pressure that a very perfect contact results.

Referring to the illustrations which we give here, front or face view of the disc is shown, with its three contacts spaced symmetrically around its periphery. As the disc closes the circuit, it is supposed to make three contacts and will do so infallibly if in good condition and in adjustment. Means are provided of course for insuring this result.

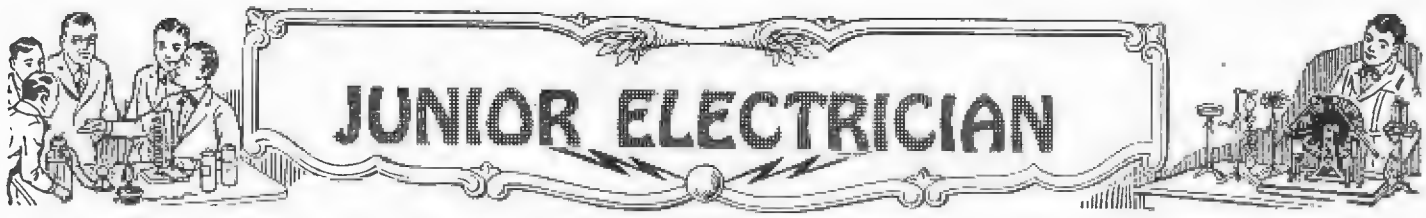
In the elevation and partial section the disc will be seen a little above the base plate, and this disc it is which snaps back and forth, and from this action with its clicking sound is derived a trade name, Klixon, which is sometimes applied to this device.

Two views are given of the thermostatic disc used in the Spencer flatiron, for preventing it from attaining too high a temperature. The disc snaps back and forth like the bottom of a machinists' oil can, opening and closing the circuit.



Front view and elevation partly in section of the Spencer disc thermostat carried on its base. The three contacts are in parallel giving very low resistance.

www.americanradiohistory.com



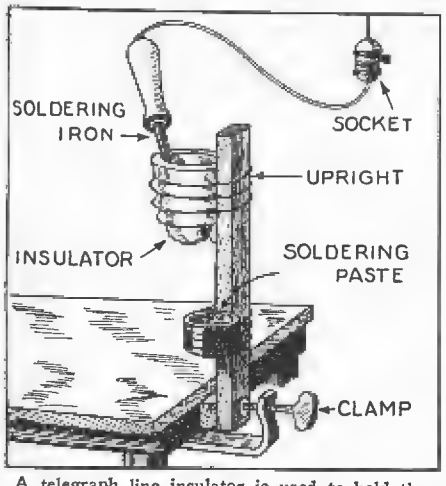

## High Speed Soldering Outfit

By J. G. Villepigue

Here's the trouble saver supreme, for the experimenter. You don't have to fool with solder and acid, or watch the hot end of the iron with this outfit.

Just get a board about 1"x2"x8" (an inch or so either way won't ruin the works), then a ten cent clamp with which to fasten it to the bench. Take a flexible piece of wire, (No. 18 or bell wire) and fasten the can of paste to the upright at about table height. Next a (green) glass telegraph line insulator, like those used on telephone poles, is to be fastened to the top of the upright with a piece of the bell wire.

Now pick up those little drops of solder that fell off the iron when you wired that last radio set, and put them in the insulator. The iron can be left in this holder without any danger of starting a fire, and being shielded from air currents, it will take less time to get hot. When using it, touch it to




A telegraph line insulator is used to hold the electric soldering iron along with some bits of solder and some soldering paste.

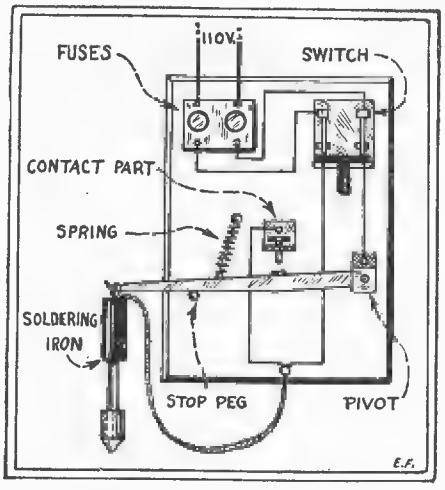
the soldering paste and put back in holder. Some of the drops of solder will melt on to it and the iron is ready to go. If you are afraid of the hot iron cracking the glass, put a plug of pumice stone hollowed out for the point of the iron inside the insulator.

The only caution to go with this outfit is to beware of poles carrying high tension wires when getting your glass insulator, if you want to get it that way.

## Switch Mounting for Electric Soldering Iron

We have heard of soldering irons left upon the bench with current turned on overnight. Not only does this involve a waste of electric power but there is a certain element of danger in it, as the iron may get so hot as to cause a fire or perhaps only a charring of the bench.

The illustration shows a switch mounting suggested by the telephone switch. The illustration is self-explanatory. There is a line switch and when this is open no current passes. But when closed current will pass through the soldering iron, connected as shown, when it is removed from the hooked




Another arrangement for an electric soldering iron. A hook-switch automatically cuts off the current when the iron is lying upon it.

end of the lower spring switch. A spring draws the bar up so as to close the circuit when the iron is removed as it must be when in use.

If not in use the iron is to be hinged upon the switch-bar drawing it down and breaking the contact and opening the circuit even if the main switch seen in the upper part of the box is closed.

## Damping a Galvanometer

In a laboratory in which many galvanometer deflections had to be read in rapid succession, a novel method was used to bring the underdamped and overdamped galvanometers back to zero. A Faraday's disk was built and placed across the galvanometer terminals and was left in open circuit. After the deflection was read, the disk was put into the circuit and by a slight rotation the galvanometer is brought to zero.

The Faraday's disk consists of a copper disk mounted on an axis so that it rotates between the poles of a horse-shoe magnet. The edge of the disk dips into a mercury trough. Rotating the disk sets up an induced voltage and by closing the circuit, a small current is obtained.

*By Reporter 22813.*

## The Invisible Cartoonist

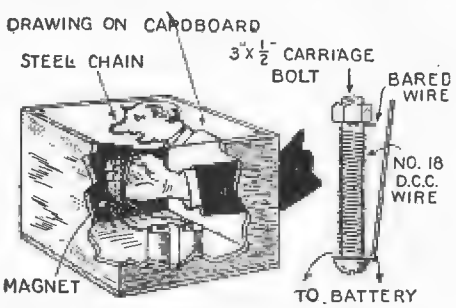
By Arthur Flinner

Drawing with electricity, that's what this is. A box of old boards is made large enough to hold two dry cells and with plenty of room for one's hand to travel about inside. The size depends on the kind of boards used. There is no top, but in one side a hole is cut large enough for one's hand to enter easily.

On a piece of thick paper or cardboard draw part of a profile of a head as shown but leave off the nose, mouth, and chin. A steel chain is laid to form these and is cut off at what seems to be the proper length. Then ends are put through holes in the paper and several drops of glue are dropped on them from the other side to hold them. A screw in each corner of the top keeps this from slipping about.

An electromagnet is made of a bolt, some wire—nearly any size will do just so it isn't too large and clumsy—a brass or copper spring about three inches long and a short piece of tape. The wire is wound on the bolt until it is covered with about five layers. One end goes to the battery and the other end is curled around under the end of the spring opposite the end that is tapped to the magnet. This end of the spring is connected to the battery, and represents the switch. When one wants the circuit to be closed making the electricity flow through the magnet, this spring is pressed and it touches the curled piece of wire, thus closing the circuit.

The cells and magnet are placed in the box where they are completely out of sight. One's hand is put inside and moves the magnet about under the chain while pressing and releasing the switch alternately. The chain follows the magnet. With some practice one learns when to press the switch and when to release it and many funny faces can be made. It is wise to make several of the part-profiles




An iron chain is made to form all sorts of queer profiles by the action of a concealed magnet moved by the performer.

so they can be changed—old maids, fat men, bald men, scowling men, bobbed headed girls, crying babies, are a few possibilities. One caution—practice considerably before exhibiting your skill before your friends and you will have more fun. The faces will be made quicker and will be funnier.

Another point to be remembered is to use a chain of soft iron or if of steel to draw the temper. An extemporized chain can be made out of paper clips springing them together.

## Simple Battery Charger

A 10-volt bell transformer is connected to a supply line (AC) and one of the leads is connected to a buzzer which is also connected to a rheostat through an ammeter to the battery. The other end of the transformer is connected to the opposite end of the electro-magnet and the vibrator. The current is then taken from a contact on a set screw to the vibrator and is then sent to the storage battery.

If D.C. current alone is available, the preceding arrangement will not work. For this purpose a simpler charger can be constructed.

Connect battery to one of the 110-volt lines. The other line is connected to ten 60-watt lamps in multiple to the battery.

To determine the polarity, force the leads going to the battery into a potato. Around one lead the potato will become pinkish. This wire is connected to the positive end of the battery. The leads to the battery must not be more than three feet long.

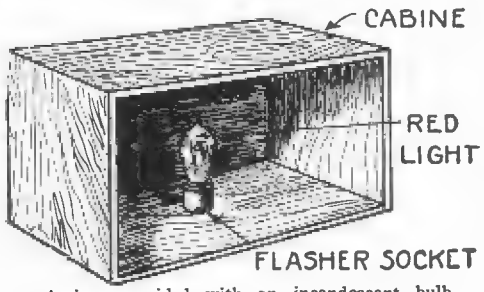
*Contributed by Wilfrid Thelen.*

www.americanradiohistory.com

## Picture Display Apparatus

WE have had occasion to speak of the two separate ways of lighting clock faces, advertisements and the like, by lamps placed behind transparent screens or by light from lamps in front.

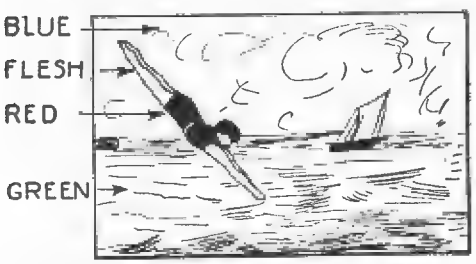
In the apparatus we illustrate, which has been recently patented, both systems of lighting are employed. There are two power-




A box provided with an incandescent bulb within, serves as the cabinet displaying two pictures alternately.

ful incandescent lamps contained at the bottom or rear of a sheet metal casing, open at the front. A composite picture is to be used.

First comes a sheet of glass, then a piece of translucent paper painted in thin transparent colors. This is to be exhibited by reflected light or by flood lighting. Back of this is a second sheet of paper on which there is another picture, and this is to be shown by transmitted light. A flasher is

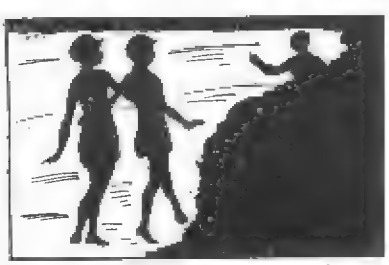



Both pictures are painted on the same screen. One, shown above is seen when the inside lamp is dark.

provided to turn the lights on and off as required.

For flood lighting the lights may be arranged all around the frame or front of the box, or may be simply distributed along its upper edge. They are contained in a little trough to mask them from direct observation. Back of all the pictures is a second sheet of glass.

Thus when flood lighting is used the front picture is seen. When this ceases, the lights within the box are turned on, and the second picture being of more vivid tints, overpowers the design of the first picture so that it is virtually invisible.

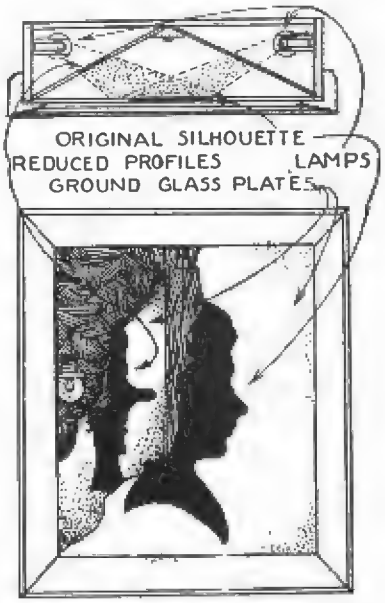


The other picture is a silhouette painted on the reverse side of the screen and can be seen only when the inside lamp lights. In this condition the other picture is invisible.

## Magic Silhouette

By PHILIPPE A. JUDD

YOU have, no doubt, heard of the D. T.'s —maybe you've had 'em, but—when a perfectly lovely silhouette of a Follies belle changes before your very eyes into a likeness of your landlady—and then to something even worse—well, you begin to wonder just what was in that last drink your friend mixed you. And when the thing reverses, and does it all over again, you feel like tearing the rather thick frame apart




Figs. 1 and 2. This device will enable you to mysteriously flash on its screen two different silhouettes. The display-box being very small it is difficult to see how the change is accomplished.

to see what makes it go. Well—here's what you'll find.

The frame isn't an ordinary frame, by any manner or means. The fact is—it holds quite a bit of junk behind its deceptive front. You will find two small electric bulbs, their sockets, and two ground glass plates arranged in the shallow compartment behind

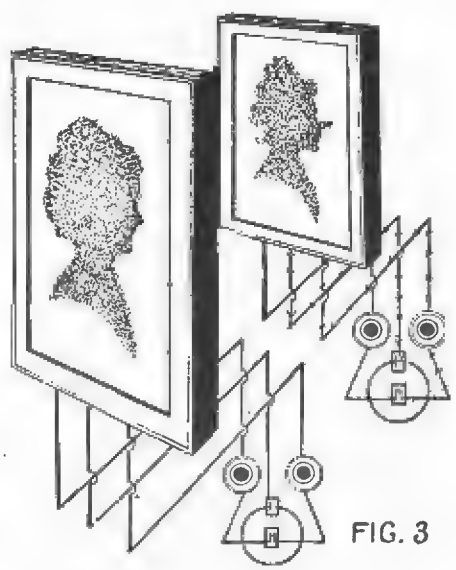



Fig. 3. Each of the pictures is controlled by two different electrical circuits from the same source. Two switches are provided.

the harmless looking chorus beauty. Figs. 1 and 2 show the constructional details.

The lamps are placed in the rear corners of the compartment, and are wired as in Fig. 3, the wires, battery and buttons being concealed. Each lamp has a ground glass partition between it and the front glass which carries the original silhouette. Each of these partitions has, directly in line between its lamp and the front figure, a reduced copy of the front silhouette, of such dimensions as to throw an exact duplication of the figure on the front glass. When these have been adjusted, so that the original silhouette remains the same, whether unlighted, or lighted by either or both lamps, the features of the small profiles are ready for the exaggerating process.

This consists of adding to the various features so as to alter their appearance, as

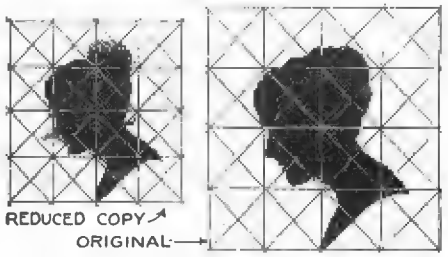
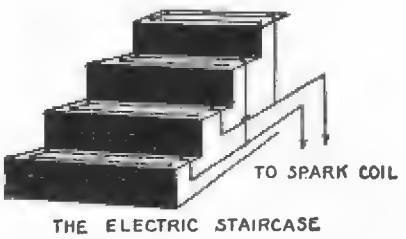



Fig. 4. The picture on the glass slide from which the silhouettes are projected must, on account of its inclination to the screen, be reduced. The illustration shows this reduced copy and the silhouette projected from it.

shown by the shaded portions of Fig. 4. It must be done very carefully as each alteration is magnified by projection. The silhouettes are all done in black Indian ink, or an opaque black paint, upon ground glass or parchmentized paper. Fig. 4 shows the method of reducing the original profile. The operation is obvious. Hook it up and press the buttons. Fig. 3 shows what will happen.

## Shocking Experiments

By CONSTANTINE TROY




THE ELECTRIC STAIRCASE

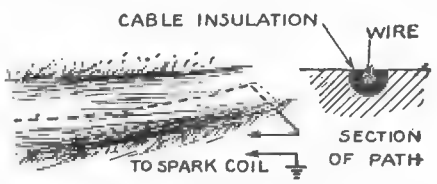
Your staircase can be easily electrified by the method illustrated above. This method will delight the heart of any practical joker.

DO you belong to that much loved (?) class of experimenters who delight in shocking their fellow creatures? Shake! I do, myself. Well, now that we have something in common, I'll let you in on a few tricks in our profession that'll make 'em sit up and take notice.

For the first one, a wooden stairway is needed (it may run up or down), some tacks, bare copper wire and the good old spark coil. To fix 'er up is just as easy as laying a carpet. String a wire back and forth across each step as shown and connect alternate steps to the two wires running to the coil.

When you hear "Pa" coming home from work, turn on your old coil and let 'er run!

Well, the next one shows how to "juice up" that footpath that runs through the back garden. An insulated wire when the ground in wet will give a satisfactory shock, satisfactory at least to the proprietor of the installation and will give plenty of juice.



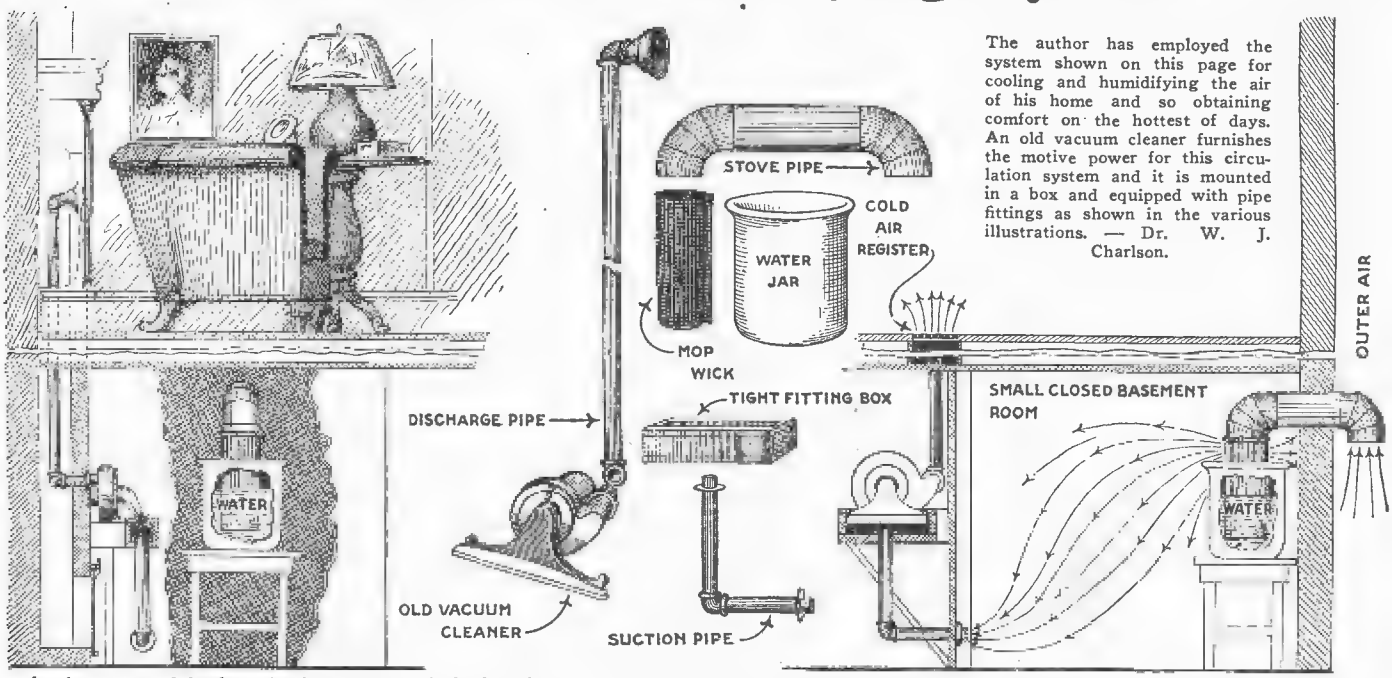

THE ELECTRIC FOOTPATH

One terminal of the coil is connected to an insulated cable under a path, a bare portion is exposed at the surface. The outer terminal is grounded.

www.americanradiohistory.com

# THE CONSTRUCTOR

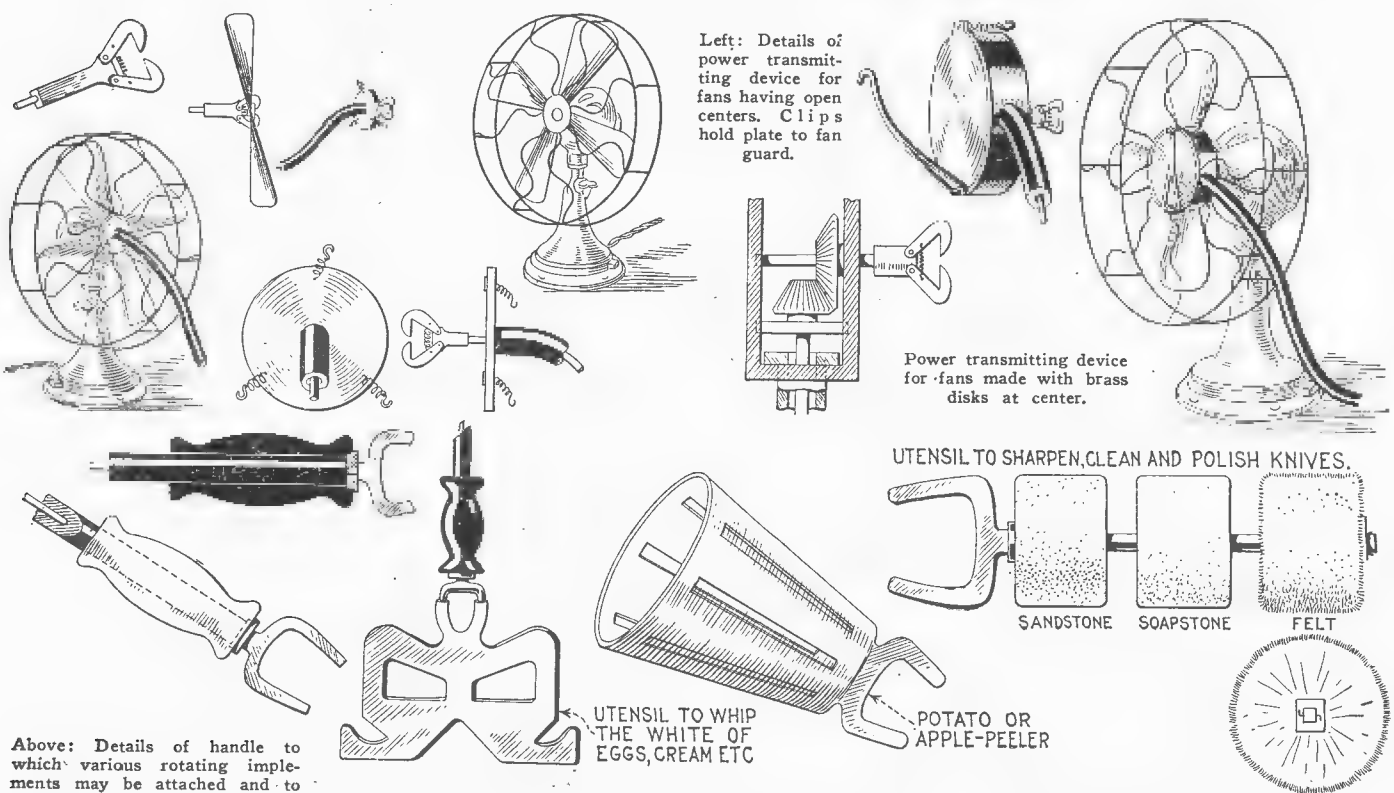
## Cooling and Humidifying System




The author has employed the system shown on this page for cooling and humidifying the air of his home and so obtaining comfort on the hottest of days. An old vacuum cleaner furnishes the motive power for this circulation system and it is mounted in a box and equipped with pipe fittings as shown in the various illustrations. — Dr. W. J. Charlson.

At the extreme left above is shown one method of applying this system and delivering the cooled humidified air through a fireplace opening. At the extreme right is shown another system for application to houses equipped with registers in the floors. In any event, the apparatus is placed in a basement and the water container is located in a small closed room. The air is drawn out of this room and fresh air supplied through the intake pipe and through the water container. Here the air is both cooled and humidified and is then delivered to the home above.

## Utilizing Electric Fans for Power




Left: Details of power transmitting device for fans having open centers. Clips hold plate to fan guard.

Power transmitting device for fans made with brass disks at center.

Above: Details of handle to which various rotating implements may be attached and to which power is supplied by means of an electric fan motor through a flexible power transmitting shaft.

Above: Special utensil used in place of the usual hand type of beater with good results.

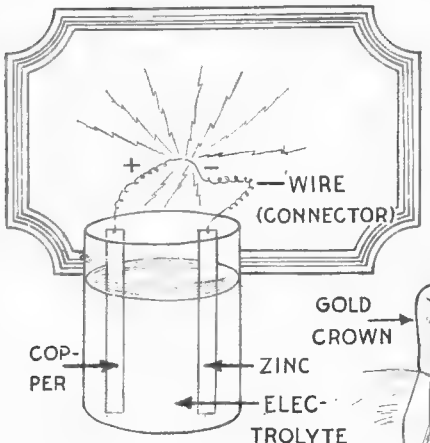
Above and to right: Various devices are shown here that can be used with the handle shown at the left, connected to fan.

With all these utensils, the coupling parts are made of tubing to slip over the tines of the handle illustrated.

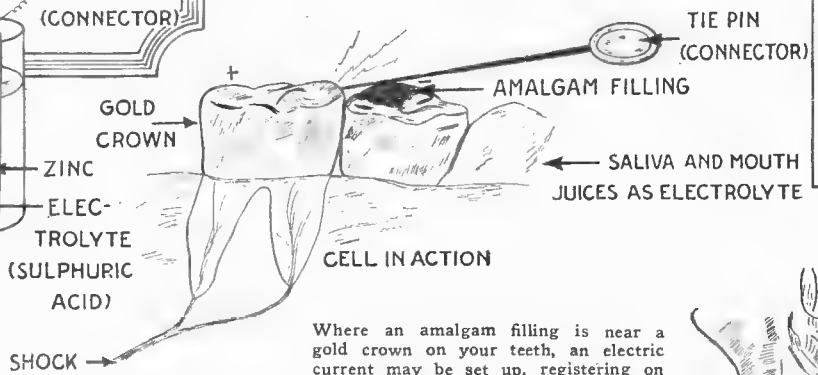
www.americanradiohistory.com

# Is There a Battery in Your Mouth?

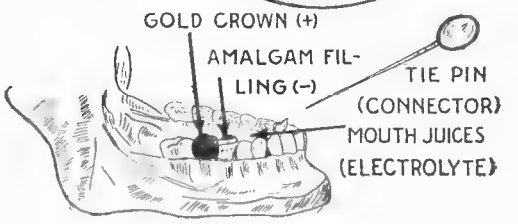
By CLYDE E. VOLKERS




A simple electric cell is illustrated directly above. Connecting the elements produces a current.



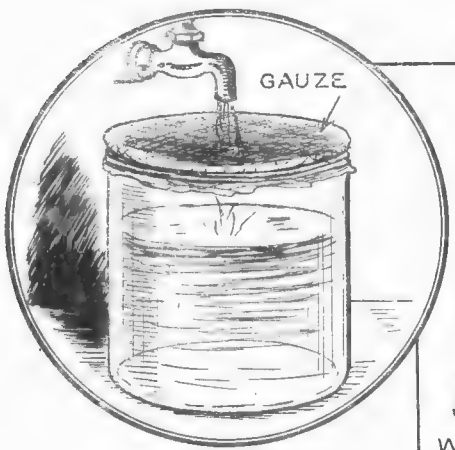

Where an amalgam filling is near a gold crown on your teeth, an electric current may be set up, registering on the nerves, by connecting gold and amalgam together. Fuller description below.

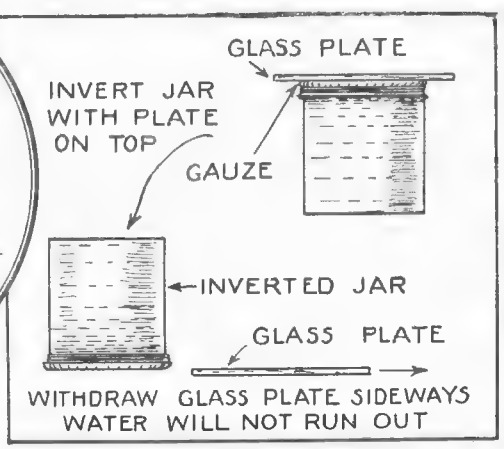


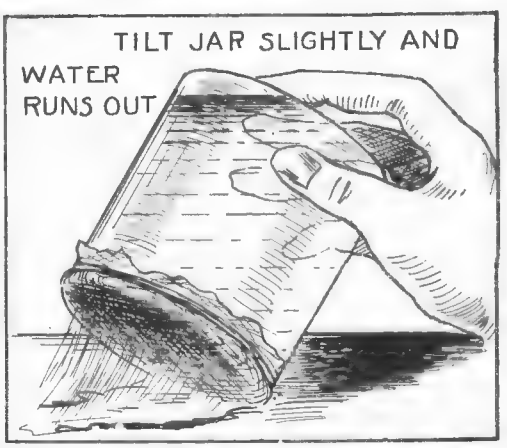

ELECTRIC CELL IN MOUTH

We have batteries in our automobiles, batteries in our radio sets, batteries in our pocket flashlights, and so we need not be surprised to find that we have one in our mouths. If a piece of wire or a pin is placed across an amalgam filling and gold crown, as shown above, a distinct and painful shock will be felt. This is because of the current of electricity set up by the action of the saliva upon the two dissimilar metals, which is much the same as that found in the simple electric cell illustrated at the left, although on a much smaller scale.

# Mysterious Jar of Water

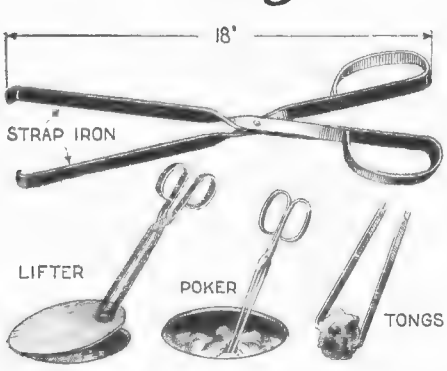


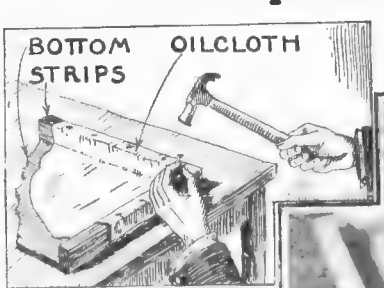

A very peculiar and interesting effect but one which is governed by a well known law of physics may be produced as illustrated above and at the right. Stretch a piece of gauze with about 14 threads to the inch over the mouth of the jar. Fasten it in place with thread and fill the jar with water as shown. Place a glass plate on top of the jar and then invert, Upon withdrawing the plate the water will not run out, but if the jar is tilted, it will do so. As long as the jar is truly vertical, each opening in the gauze forms the end of a column of water upon which the atmospheric pressure acts. When the jar is tilted, the equilibrium is destroyed and the water runs out. —C. A. Oldroyd.

# Tongs



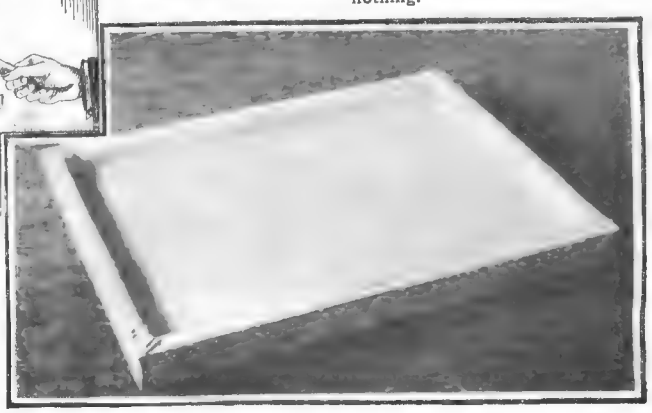

A pair of tongs made of strap iron in the shape shown above are very handy around the kitchen stove. They may be used as a lid lifter, poker or tongs for removing clinkers. —S. W. Wilt.

# Inexpensive Photo Trays



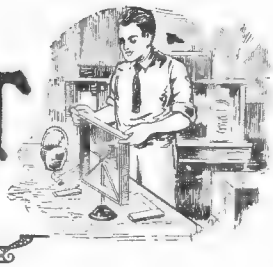

In making home-made photo trays, a wooden box of the required size is made and then lined with oilcloth, placing all of the tacks around the top and the outside. No leakage will result. —J. G. Pratt.

Ready made photographic trays of a large size are exceedingly expensive but home-made ones cost practically nothing.

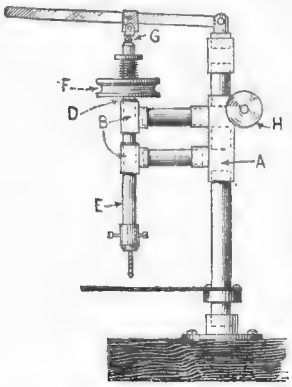


www.americanradiohistory.com

# HOW TO MAKE IT

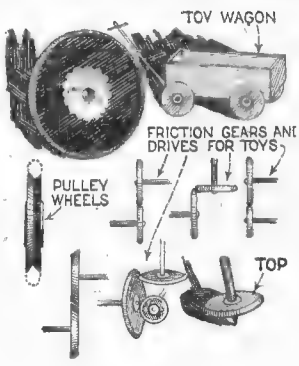


## Bench Drill



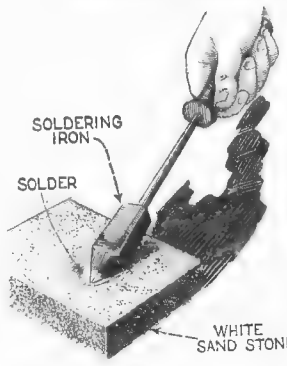

In the bench type of drill press illustrated at the left, A indicates two ¾-inch by ½-inch center T pipe couplings; B, two ½-inch Ts; D, brass bushings; E, steel shaft; F, pulley; G, thrust bearing and coupling and H, another pulley. The entire press is mounted on a pipe flange.—L. J. Harris.

## Uses for Erasers




Circular typewriter erasers may be put to various uses as illustrated at the left. Wheels for toy wagons are made without any changes in construction of the erasers. Friction gears and various other transmissions for small mechanical toys are easily constructed and work well.—John P. Howe.

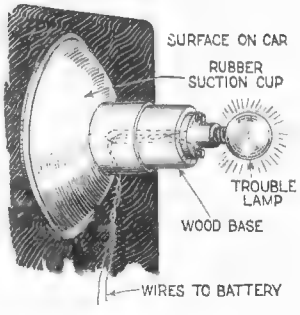
## Cleaning Soldering Irons




The soldering iron tip needs frequent cleaning and retinning. Make a small hollow in the center of a sandstone block or smooth brick and place a small quantity of solder with some resin therein. Tin iron by rubbing the tip on the surface of the stone.—C. T. Torresen.

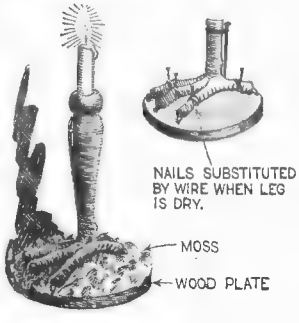
## Trouble Light

For holding an electrical trouble light to a surface where the ordinary magnetic type will not operate, the kink illustrated at the right can be employed. Attach a suction cup with a short piece of wooden dowel.—C. A. Oldroyd, Rep. No. 4433.



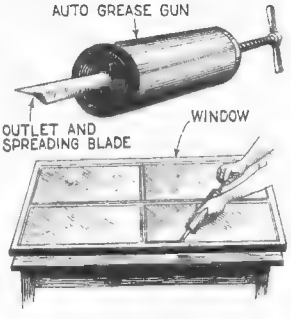

## Candlestick

An unusual type of candle holder can be constructed from the leg of a fowl as shown at the right. Cut off the foot at the joint as shown, fasten it to a wooden base and allow it to dry for thirty to sixty days.—Hubert Slouka.

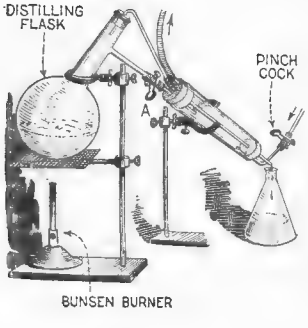



## Putty Tool

If an automobile grease gun is changed so that its outlet is angular and flattened out as shown above, the body of the gun can be filled with putty and that material forced into cracks.—R. C. Leibe.

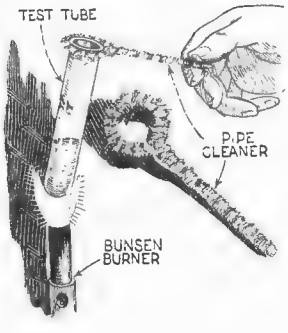



## Continuous Still



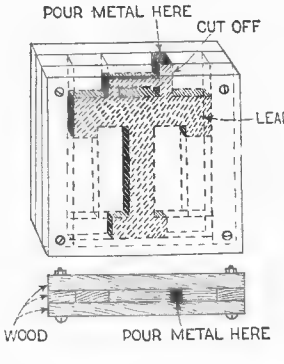

The pinchcock A is normally closed but when it is desired to fill the flask, the upper end of the condenser is heated slightly and then the pinchcock is opened. The flask will be filled by the water from the cooling system. — Ray Sabin, Rep. No. 14,356.

## Test Tube Holder



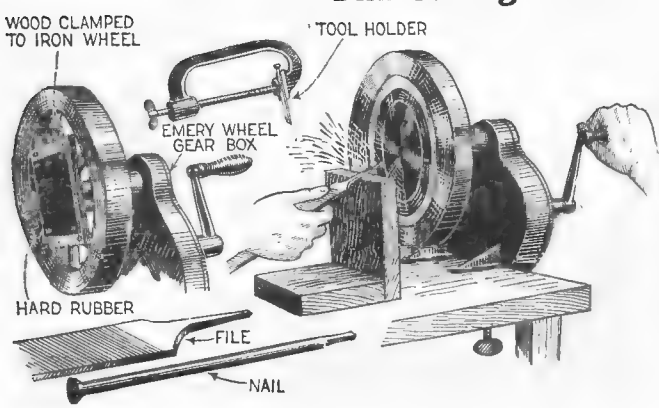

A very satisfactory holder for test tubes can be quickly and easily made by twisting an ordinary pipe cleaner into the shape shown in the illustration. If desired, use a wooden dowel as a handle.—C. A. Oldroyd, Rep. No. 4433.

## Watch Fob



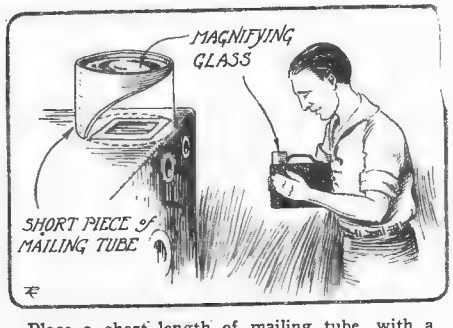

An initial emblem for a watch fob can be made by building up a mold out of wood as shown at the left and pouring molten metal into the opening. After cooling, take the mold apart, remove the metal and smooth with a file. — Walter Culin.

## Disk Cutting Lathe




For cutting disks from various materials such as hard rubber, bakelite or wood, the hand lathe illustrated at the left may be employed. The abrasive wheel is removed from an emery grinder and an iron flywheel put on the shaft in place of it. A block of wood is then clamped to the spokes of the flywheel and the material from which disks are to be cut is screwed to this block. Tools made from file tangs or ends or from nails may be employed in the manner shown. — Don Home.

## Focusing Camera




Place a short length of mailing tube, with a magnifying glass mounted at one end over the finder of a camera and focusing will be expedited.—L. B. Robbins.

www.americanradiohistory.com

**SCIENCE AND INVENTION** desires to hear from its readers. It solicits comments of general scientific interest, and will appreciate opinions on science subjects. The arguments pro and con will be aired on this page. This magazine also relishes criticisms, and will present them in both palatable and unpalatable forms. So if you have anything to say, this is the place to say it. Please limit your letters to 500 words and address your letters to Editor—The Readers Forum, c/o Science and Invention Magazine, 53 Park Place, New York City.

## HIBERNATION ONCE MORE

*Editor,* SCIENCE AND INVENTION:

In the September number of SCIENCE AND INVENTION, I read with interest the article, "Life Suspended in Ice," in which the question is raised, whether the statements found in some text-books regarding the fact that fishes and some other creatures may be frozen and then thawed out and still live may not be correct. As I, at one time, questioned this statement, I made lengthy experiments at different times, and while some of the experiments were failures as to proving the statements correct, nevertheless I found that the statement was correct when the conditions were as nature made them.

Now, to explain: In using the common method of artificial freezing, I found that, as the water is distilled before freezing, it is deprived of what air it previously contained and therefore, the fish was dead for want of air before it was actually frozen and, of course, it could not be brought to life being actually dead. (*Not so in our experiments.*—EDITOR.) Again I tried to freeze water taken from a stream in which the fish had lived, but the artificial method of freezing is different than nature, and again the fish were dead when thawed out. (*So we found.*—EDITOR.) Not being satisfied, I tried a different method. Taking a catfish about ten inches long from a brook with a metal container holding about three gallons of water, I placed it where the water could freeze by natural means, the atmospheric temperature was about two to three degrees above zero Fahrenheit, the water froze solid over night. Then placing my fish in a room where the temperature was about 32 degrees I let the ice with the fish slowly thaw out and when I looked at my fish several hours later he was flopping vigorously trying to get out and when I placed him in the aquarium, he swam around as naturally as ever, which certainly did prove that under certain conditions fish can be frozen up and still live.

Other experiments along this line were with reptiles. A common black snake, such as is found in the Allegheny mountains, was found frozen hard, as several of us out in the woods in cold weather were hunting what we might find in hollow logs and trees, and carefully digging it out so as not to injure it, it was placed near a fire so that it could thaw out gradually, and in the course of time it came to itself and crawled away from the fire. The common toad has been also found frozen solid in the ground and after being dug out and left to lie in the sun a short time, has hopped off as lively as ever.

There is an aquarium located in Gates Park, Topeka, Kansas, which contains numerous fish, mostly goldfish, which are never taken out. The water is fed in a small stream continually during the time it is not frozen, but when winter comes, and the temperature gets to zero, the water freezes to the bottom, but there are always fish swimming around in it when it thaws out again.

Experiments I found do not always prove the truth or falsity of a statement unless they are tried under the same conditions that existed when the statement was made. No doubt many affidavits can be procured from reliable sources to prove that fishes, toads and snakes are frozen up and come back to life when thawed out.

E. L. CORLE.
Arkansas City, Kan.

*(In our artificial methods of freezing, we used ordinary water, not distilled water. This water was placed into a tank which was then put in the refrigerator. The temperature of the ice compartment was considerably below freezing. The only way in which our conditions differed from yours was that the freezing experiments were made during the summer time and not in the winter months. Nevertheless we thank you very much for your comment and thank the thousands of other readers who have commented upon our article "Life Suspended in Ice." This article carried with it a great deal of interest, and we have heard from many readers who have claimed to have actually noted instances where fish, reptiles and toads were actually frozen and then thawed out and on the other hand have heard from many who have carried out artificial experiments and who have received the same results which we outlined.*

*Our own experiments were meant to produce artificially a state of completely suspended animation. When animation had been completely suspended, we found that life did not return. Of course there is always a possibility for a technical error somewhere. No one has as yet come forth and given us any statements of experimental proof and data for duplicating the experiments, or has demonstrated that such artificial hibernation may be induced.*—EDITOR.)

## PAGE DR. HACKENSAW

*Editor,* SCIENCE AND INVENTION:

I have just received the November SCIENCE & INVENTION and very much regret the demise of Doctor Hackensaw. When he didn't appear in October, I thought maybe he had run out of material for the time being, but the fact that he is still absent has made me worried about the illustrious doctor. I have taken this magazine I think from the beginning of its career and the Dr. Hackensaw articles in my opinion were great. They were always the first I read, and I am very sorry to say that I'll miss them. I like your present serial "Tarrano the Conqueror" very much. It is on account of articles like these that I buy your magazine. It is my favorite and I am always on the lookout for the next number.

R. J. PEARCE.
Cardinal, Ont.

*(We are glad you like our scientific fiction stories, and "Dr. Hackensaw" may be back anon, but at present he cannot write articles for a while, as he has left Turkey and gone on to India where he will be for some time, according to his last letter.*

*We think you will find Mr. Cummings' story, "Tarrano the Conqueror" very interesting as it goes along, and we are gratified at your interest in* SCIENCE AND INVENTION.—EDITOR.)

AMAZING STORIES

THE new scientific fiction magazine, AMAZING STORIES, will be on the newsstands March 10th. Here is a magazine after your own heart. Readers of this magazine who have read the scientific fiction stories for years will welcome AMAZING STORIES with open arms.

The new magazine contains only scientific fiction type stories and in the very first issue there is a story, "Off on a Comet," by the immortal Jules Verne, stories by H. G. Wells, George Allen England, G. Peyton Wertenbaker, and many others from the pens of the foremost scientific fiction writers.

AMAZING STORIES has secured the sole rights to all of Jules Verne's stories, written by this, the greatest of all scientific fiction writers. All of these stories will appear in AMAZING STORIES.

Be sure to get your copy today.

The magazine is edited by Hugo Gernsback.

PRICE 25c PER COPY.

## LIKES SCIENCE & INVENTION

*Editor,* SCIENCE AND INVENTION:

I consider your magazine a real educator in the field of science and especially liked the old issues in which gravitation, astronomy, Einstein and his theories, and many of the vastly important scientific subjects were discussed by your many authors.

I believe a school equipped with your magazines from the earliest dates possible to the present time would scarcely need a scientific encyclopedia. Your magazine contains more information considering dollar for dollar spent than any other "grand" set of books in the library, because in your publication more than one author discusses a subject, because one would have to have more than an encyclopedia to cover all the subjects you discuss, and because your discussions are timely and right up to the minute. I make it my duty to study your magazines every month, and will certainly continue to do so.

LELAND LOCKHART.
Rock Falls, Ill.

*(We are glad that you enjoy* SCIENCE AND INVENTION *magazine and we will try to make it appeal to you more and more every month.*—EDITOR.)

*Editor,* SCIENCE AND INVENTION:

I have been a reader of your magazine for over five years and thought I would write and tell you how I appreciate SCIENCE AND INVENTION. I also would like to state that I have been to various research clubs and heard many discussions on the subject—Does a dream take as long as the dream seems, or is it a "flash" thought? I believe I did have proof that it is an instant thought. Although you may know this, as I am in the common thinking class. I have heard hundreds who thought differently.

My room companion used to be sound asleep when I would come home late at night. I would roll up some newspapers and hit him on the head, lightly of course, but sharp enough to make him feel it. He would wake right up and say, "some dream." He would then relate some accident where he would have hit his head, or had a headache, etc., but always with reference to his head. If I hit him on the feet, arms, legs or any other part of the body, the effect was the corresponding one, and the dream accident would concern the feet, arms or legs as the blow was given. Does this not prove that dreams are instantaneous? I would like to see this brought up and discussed.

FRED LANKTON.
St. Johns, Mich.

*(Your question concerning the length of time it takes to dream is very interesting. Most observers claim that a dream takes but a fraction of a second, and that the longest dream does not take any more than ten seconds. They all hold to the theory that the dream takes place between the totally subconscious state and the conscious state, and it is during the passing from the subconscious to the conscious that the ideas develop and rapidly pass through the mind. Here is an interesting example of this and it constitutes a first hand experience which shows how quickly these ideas pass through a man's mind.*

*While attempting some high dives toward the fall of the year when the beaches were rather free of people, the writer leaped off a platform about twenty-eight feet above the surface of the water. In mid-air he saw a log floating beneath him. During the time that it took to strike the water, a vision of hitting the log with a complete crushing of the skull was seen. The writer saw his own body being dragged out of the water, placed into a patrol wagon and taken down to the city morgue, there to be identified by his relatives. He saw his own funeral and then saw his own home six months after the incident.*

*Now you must remember that a body will fall thirty-two feet in one second. Consequently the dive of twenty-eight feet took not far from a second to complete, and during this fraction of a second, scenes which naturally require six months, rapidly flashed through the mind.*

*This seems to prove that a dream takes place in a very short time, and the remarkable portion of the whole question lies in the fact that the dream took place while the subject was fully conscious.*

*Your own experiments are very interesting, but they have been made previously.*—EDITOR.)

## AIRPLANES IN THE NEXT WAR

*Editor,* SCIENCE AND INVENTION:

In the September number of SCIENCE AND INVENTION, an article entitled "Airplanes and Tanks in the Next War," by H. Winfield Secor, contains a statement that, "In the next war, if it should occur, one of the greatest problems the army experts will have to solve will be how to protect our cities and towns from gas attacks by the enemy." I think that I have an adequate solution for this problem, which I will now describe:

Gas attacks by air can only be effective if the gas cloud is laid close over the city. Hence, if the strata of air from the housetops of a city up to about one thousand feet can be so guarded that it would not permit airplanes to enter, the city will be safe as far as gas attacks are concerned. My system will demand that captive balloons in groups of about eight or ten be sent up with a highly explosive bomb that can be exploded by an electric current controlled by a look-out in another captive balloon or dirigible. Any large city will be divided into squares, each having its four air stations where captive balloons with highly explosive bombs will be sent up. Enemy aircraft will not be able to send down the balloons by firing at them, because the airplanes will have to keep about three hundred feet away from the bomb to avoid the effect of the bomb exploding; besides, one shell will not be sufficient to bring down all the balloons in the group. The extreme difficulty of hitting the target, which is the protective balloon, is another advantage of this system.

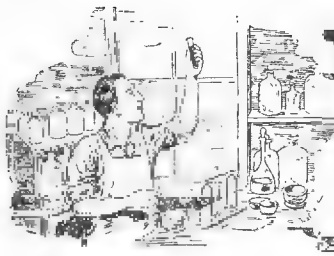
B. SCHWARTZ.
Brooklyn, N. Y.

*(We have read the explanation of your system of preventing gas attacks in future wars, but do not see that your system would prove particularly efficacious in any way, as the bombing planes can drop gas bombs from any height desired, and probably would not drop them from any lower altitude than four or five thousand feet over cities, owing to anti-aircraft guns firing at them, etc.*

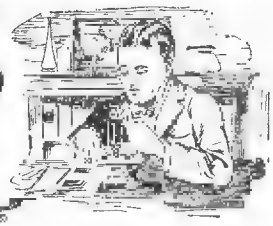
*The first thing about cities in a future war is that, owing to their large area, they prove an easy target for bombing from a high altitude of from five thousand to ten thousand feet, or even twenty thousand feet, as the bomber can hardly fail to do a lot of damage, nor can he miss the target in most cases. No matter where the bombs land and burst, they will do a lot of damage for the immediate areas will be charged with gas.*—EDITOR.)

**Prize Winners in our "Uses for Old Photo Films" Contest will appear in the May issue of SCIENCE & INVENTION.**

www.americanradiohistory.com

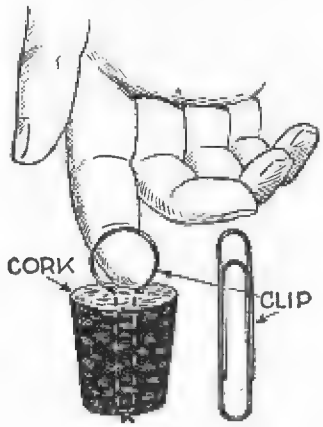


# WRINKLES
## RECIPES & FORMULAS



Edited by S. Gernsback

### CORK PULLER



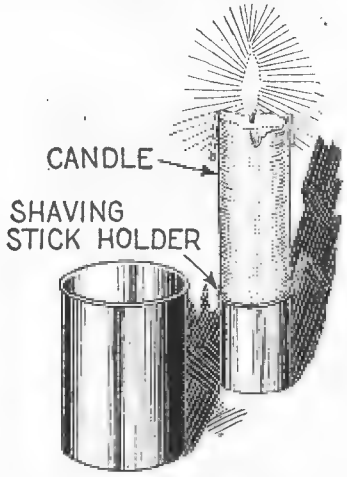

If a standard wire paper clip of the type shown is straightened out and the ends thrust through a cork so as to leave a small ring projecting as above, the cork can be readily removed from a bottle by pulling on the ring. The ends projecting past the lower end of the cork should be twisted together.

—John V. Tallas.

### HAT PROTECTOR

When hats are to be put away for any lengthy period of time, some provision should be made for protecting them from dust. If two double sheets of newspaper are placed on opposite sides of the hat, and the edges sewed together as shown above, ample protection will result. —Mrs. Helen Smar.

### CANDLE HOLDER

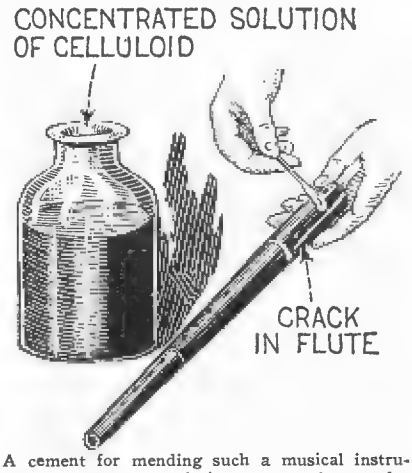



The ordinary candle will not usually stand upright on a smooth surface because of irregularities in its base. If it is placed in a metal candle shaving stick holder as shown above, this trouble will be overcome and the candle will stand straight. Author please send address.

### PAINT REMOVER

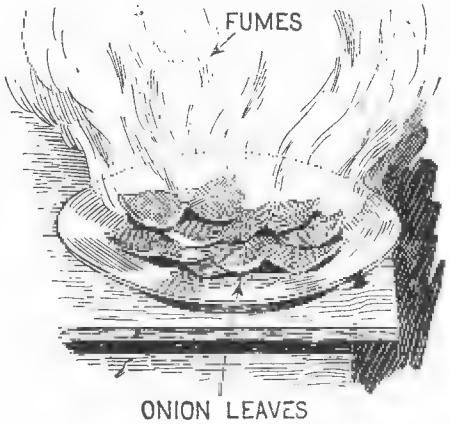
Paint stains that will not yield to ordinary soap can quickly be removed from the hands by applying a small quantity of carbon-disulphide and rubbing off with a piece of cotton waste. The same system can be applied to cloth or woodwork. As it is very inflammable use it away from any fire.—J. H. Byers.

### CEMENT




A cement for mending such a musical instrument as a flute, a clarinet or an oboe or for mending celluloid articles can be made by dissolving celluloid in amyl acetate or acetone. Make concentrated solution.—W. M. Goldberg.

### DEODORIZER

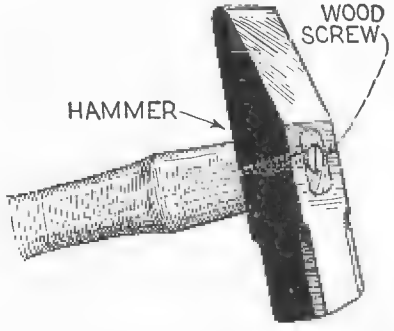



The odor of fresh paint is extremely nauseating to many people and it is a difficult one to remove. If a dish of pieces of one or two onions is placed in a freshly painted room, the odor of the paint will be quickly removed. This is a simple yet efficient method of performing this work. —F. R. Moore.

### CLEANER

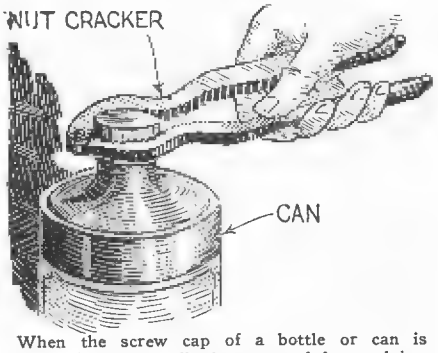
When chewing gum is found on clothing, place a piece of ice against the spot and when the gum has become hardened, due to the cold, it can readily be broken up and brushed off. —Henry H. Sweet, Jr.

### HAMMER KINK




If a wood screw is firmly imbedded in the handle of a hammer or axe, as shown above, the head will be found solidly attached and the attendant danger of it flying off will be removed. Author please send address.

### BOTTLE OPENER




When the screw cap of a bottle or can is stuck, it can usually be removed by applying a nut cracker as shown above and twisting firmly and smoothly in the correct direction for unscrewing. —Manuel Tubis.

www.americanradiohistory.com

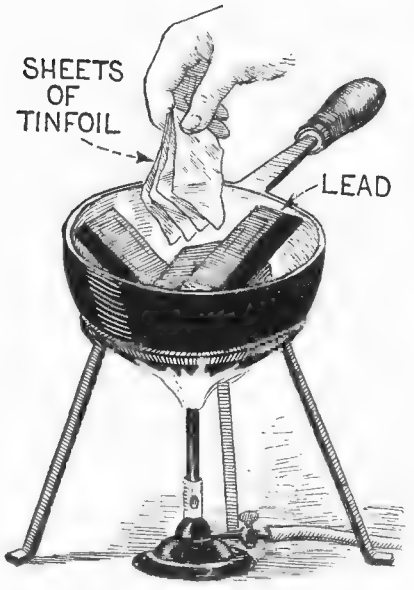
## MILK CAN SPOUT

Trouble is often experienced when pouring evaporated milk from the can but if a small disk of paper is stuck to the edge of the can with a little of the milk and allowed to dry in place, a pouring spout will be formed which will render this operation quite simple. The paper must be placed so that it does not cover the hole from which the milk is to be poured.
—G. L. Lepage.

## PAINT BRUSH HOLDER

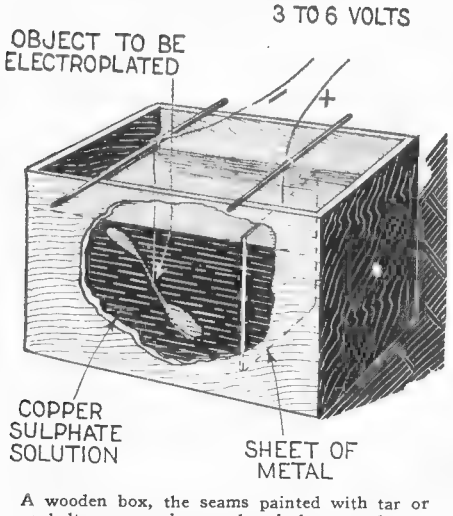
A very easily made type of holder for paint brushes is illustrated above. A right-angle hook is screwed into the handle and by hooking it over the edge of the can, the brush will always be just where it is wanted and the bristles will be kept soft because they are immersed in the paint. —T. Bernard Slater.

## MELTING LEAD



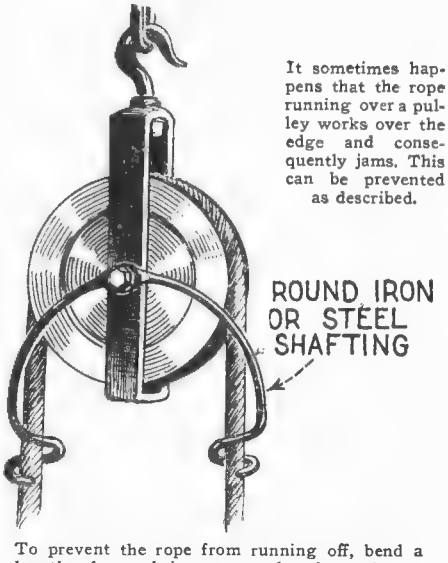

When it is desired to make small objects from lead, the melting of that metal can be expedited by first placing some tinfoil in the crucible. By doing this, the melting point will be lowered and the melting can be done with a low temperature flame. —K. Liu.

## ELECTROPLATING




A wooden box, the seams painted with tar or asphaltum, can be employed for an electroplating tank. The electrode plate connected to positive pole should be of the same metal as that which is to be deposited. —John Vomacks.

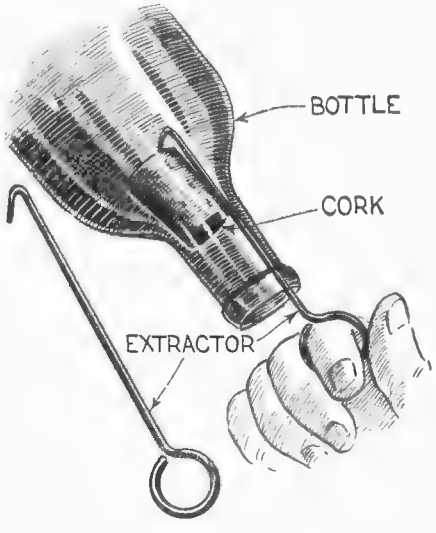
## PULLEY AID




It sometimes happens that the rope running over a pulley works over the edge and consequently jams. This can be prevented as described.

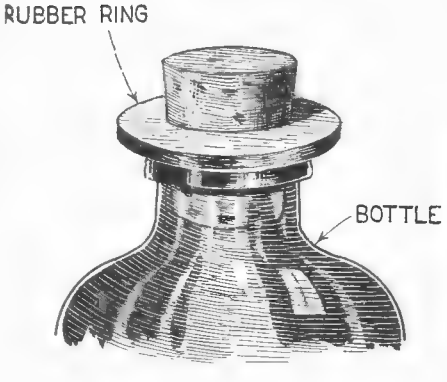
To prevent the rope from running off, bend a length of round iron or steel rod as shown, and fasten under one of the shaft nuts. This will hold the rope in place. Author please send address.

## CORK EXTRACTOR



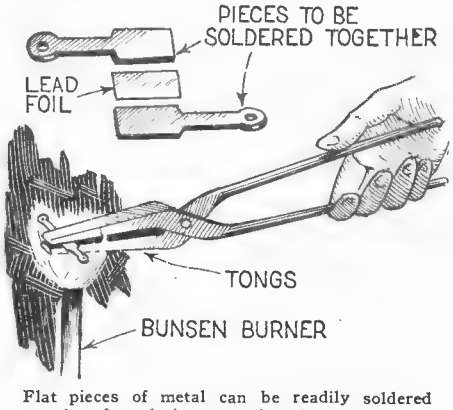

When a cork has been pushed down in a bottle it can be retrieved with a wire hook bent and sharpened as shown. A ring on the opposite end aids the operation. —Joseph Kern.

## BOTTLE PROTECTOR



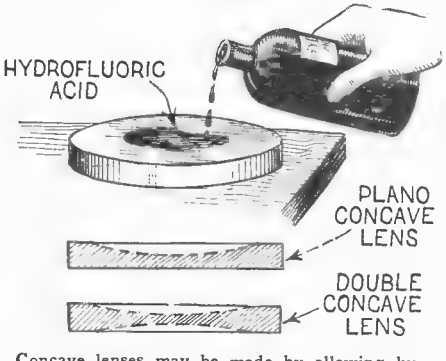

In order to prevent the accumulation of dust on the mouth of a bottle, a rubber washer may be cut and placed as shown in the above illustration. Liquids can then be poured without contamination. —Manuel Tubis.

## SOLDERING



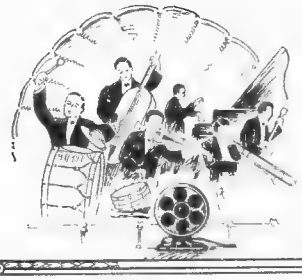

Flat pieces of metal can be readily soldered together by placing a strip of lead foil between them along with some flux and holding the assembly in a flame by means of a pair of pliers. See illustration above.
—F. J. Wilhelm.

## LENSES

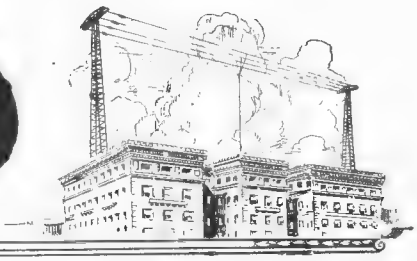



Concave lenses may be made by allowing hydrofluoric acid to act on glass disks, continuing the action until the desired results are obtained. Two types possible by this method are shown above. For a double concave lens, treat both sides of the disk.
—Mannie Stroh.

www.americanradiohistory.com

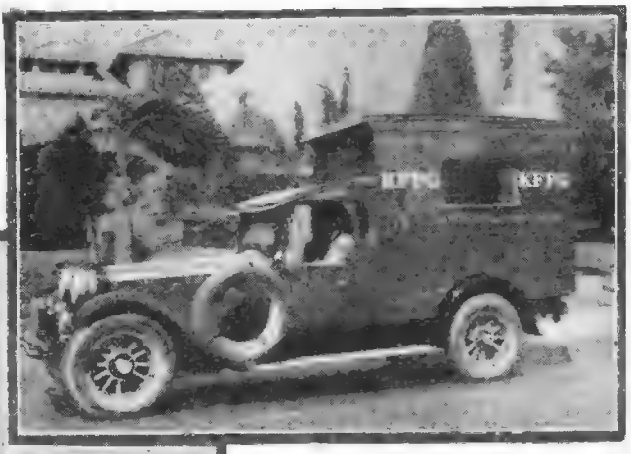


# RADIO

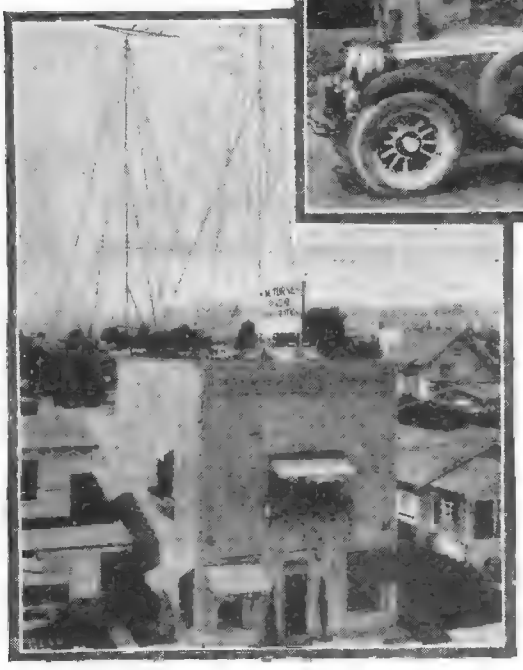


## Latest Radio Broadcast News

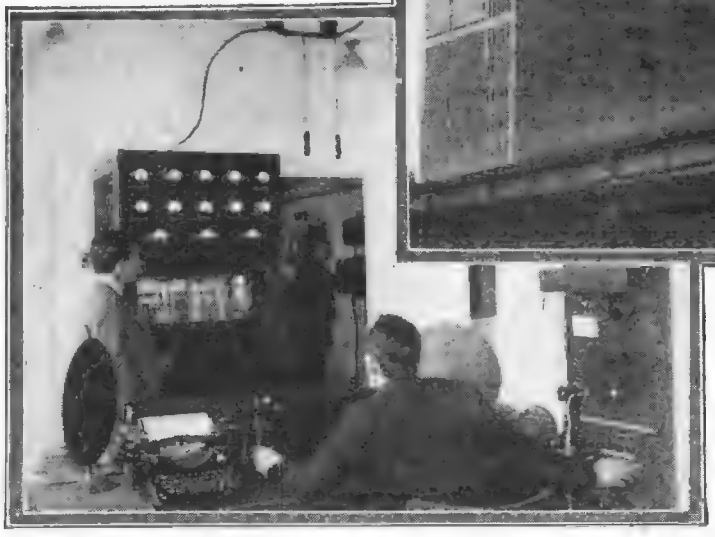
Keeping up-to-date with radio is the aim of the majority of successful dealers and broadcasters as is evidenced by the modern delivery and service car shown in the photograph at the immediate right. Advertising as well as utility are combined.



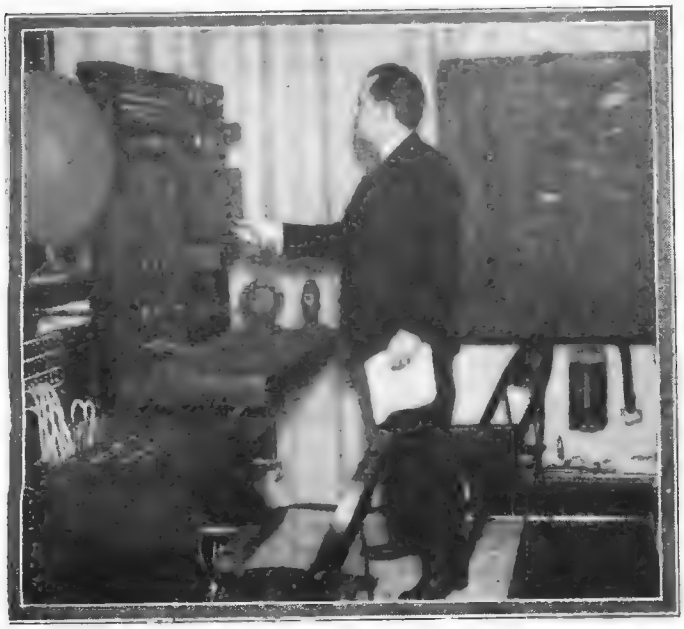
Below: The antenna masts and antenna of Station WHAP, from which jazz music is barred.



Above: The masts of station KFPG are of rather conventional yet rugged design. Below: The line amplifier used at station WHAP. This is used for remote control.



Left: The operating room at WHAP. This station is rated at 2,500 watts and the transmitter control panel is shown in the background of this photograph. Note how every part is handy to the operators and is always accessible for adjustment.



IT is indeed a far cry from the original broadcasters at Pittsburgh, KDKA; Newark, N. J., WJZ; and Roselle, N. J., WDY, with their scratchy phonograph records and tinny sounding player pianos, to the elaborate up-to-date equipment and arrangement of the various broadcasting studios spread throughout the country today. It was only a few short years ago that we were perfectly content to clamp the headphones tightly to our ears and listen with bated breath to the faint whisperings reproduced by our crystal or one-tube set. Today, however, we demand the most perfect possible reproduction and enough reproduced volume to fill an entire house. Otherwise we are not satisfied. Obviously, it has been necessary to constantly design new apparatus and redesign old instruments for transmitting purposes in order to meet the increasing demand. Not only has this been done, but, stations are becoming most particular in the types of programs that they broadcast for the general public. Years ago, any kind of music was received with gusto. Today, various radio listeners want to select their programs and pick and choose just what suits them. Things have gone so far that a new station, WHAP, recently opened on the east coast, made it a part of their policy to barr jazz and other more popular types of music from their programs and to broadcast only the classics and other more sedate selections. This station believes that the people today are developing more of a taste for the classical forms of music and so are catering to this demand. The success of their project will soon be determined. They have done everything possible to insure good transmission and are using a considerable amount of power. They should get out well and should fill a long felt want with many of our more sedate radio listeners. Aside from barring jazz, they also have eliminated advertising and propaganda of all kinds from their programs.

www.americanradiohistory.com

# WRNY for New York Visitors

**By CHARLES D. ISAACSON***

**EMITO ORTEZ**
Spanish prima donna, who has starred in opera in Italy and France, whose splendid soprano is heard often at WRNY.

**PANCHO FUENTES**
Who joins to her voice his rich baritone, in the romantic Spanish melodies which have thrilled thousands.

**VERA SUNDELSON**
Assistant program director, hostess for WRNY's artists and soother of artistic tempers.

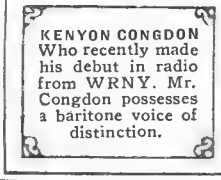
**JACK WHEATON**
You have heard Jack Wheaton's orchestra from WRNY and enjoyed its strains of lively dance music.

**Channing Pollock**
Distinguished playwright, author of "The Fool" and "The Enemy," is a frequent visitor to WRNY.

**Charlotte Trystman**
This gifted little pianiste is but 11 years old, though you may find difficulty in believing it, after hearing her at WRNY.

**Walter F. Grueninger**
You have heard him in "Harper's Magazines's" regular book reviews at WRNY.

**KENYON CONGDON**
Who recently made his debut in radio from WRNY. Mr. Congdon possesses a baritone voice of distinction.



ARE you coming to New York? Then let me invite you at once to visit the RADIO NEWS Station at The Roosevelt. You will find the hotel one of the most beautiful in the country; and there you will hear one of the very best hotel orchestras I have ever known—I refer to Orlando's Roosevelt Concert Orchestra, under the direction of Herbert Sohman. You have doubtless heard this orchestra play to you three times a week through WRNY. Here you will also see Ben Bernie, and dance to his syncopating tunes—that is if you stay at The Roosevelt, or dine here in the Grill Room. But quite apart from that, please take this as your invitation to visit the RADIO NEWS Station on the eighteenth floor, also the RADIO NEWS Transmission Room on the twentieth floor. We will be happy to meet you and to greet you. You will always find something happening, and always find many celebrities on hand. WRNY folks will be glad to write you at any time and give you any information you desire in preparing for a visit to this city.

### FOR LOVERS OF DRAMA

By the way, are you listening in every night at 7.15 to the **Radio Theatre Index?** For visitors to New York, this list is invaluable. Everyone who comes to the metropolis, of course, plans to attend the theatre, and does not want to waste an evening on a production that is only fair. The **Radio Theatre Index** will give you the exact information that you want—about the plays you want to see—where they are playing, the members of the casts, the type of plays, what you can expect in the way of music, laughter, thrills, etc.

Out-of-towners are asked, at this point, to write to the Program Director and tell what this Index means to them, and how valuable it is proving.

### THE SHOPPERS' ADVISER

Another feature at WRNY that is particularly valuable to visitors to New York is the **Radio Sales Analysis.**

Visitors to New York want to buy; they want to buy the best things that are offered, and get the best values; and every morning WRNY is now selecting the most interesting offerings of the better grade department stores and shops, for the benefit of the women particularly. This service will enable those who are planning to come to New York in the next few days to know just which stores to shop at, and which stores are offering the things that visitors are anxious to buy.

### GUIDE TO THE CHURCHES

For those who seek religious information

(*Continued on page* 1148)

**MAURICE SCHWARTZ**
The famous director of the Yiddish Art Theatre, who has made "The Dybbuk" a dramatic success in two languages, appeared recently at WRNY in character as "The Meshulach," supported by his cast of players in a special version of this play adapted for the radio.

**BEN BERNIE**
"The maestro himself," director of the orchestra which you enjoy three evenings a week in WRNY's program.

**FRANCINE VYDE**
Whom you know perhaps better on WRNY's program as "The Coloratura Soprano."

**Samuel Polonsky**
Broadcasts through WRNY the finest and most soulful violin concert numbers. He is a pupil of Auer.

**Henrietta Angstreich**
Whose Piano Dances — not dance music, but concert selections based on dance themes you know.

**Sergei Klibansky**
A famous teacher of singers, who has instructed many eminent artists, is the conductor of a series at WRNY.

**JOHN ADAM HUGO**
Composer of "The Temple Dancer," is now preparing the first opera written for radio production.

**ROMUALDO SAPIO**
The veteran operatic conductor of whom you will read more in this article, is now directing at WRNY.

**Harry Finkel, M. D**
Whose talks on "Diet" are not the least interesting of WRNY's weekly features. He tells what foods suit you

* *Program Director of WRNY.*

www.americanradiohistory.com

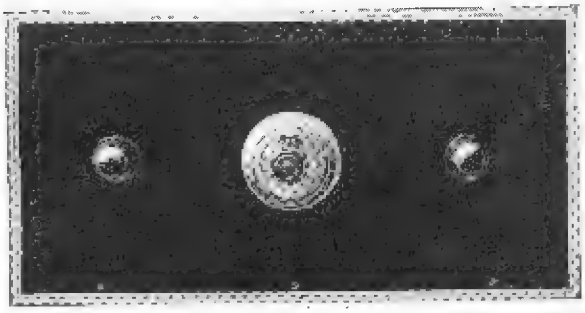


Fig. 1. The panel view of this home-made "B" eliminator shows the relative positions of the two voltage control knobs and of the snap switch in the "A" battery and 110-volt A.C. circuit.

# The Radio Constructor

## How to Build a "B" Battery Eliminator for Alternating Current That Delivers Excellent Results and Is Not Noisy

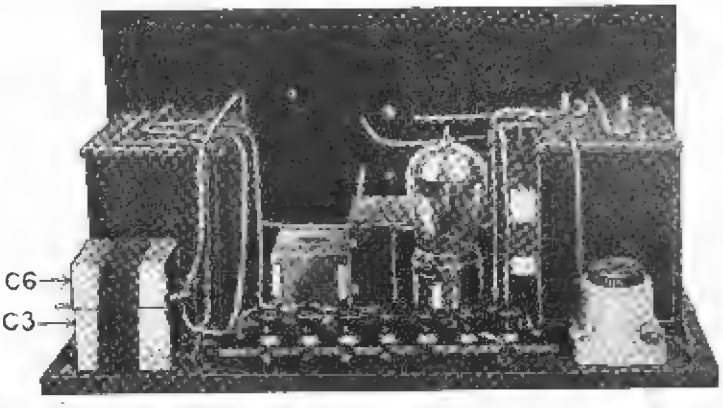
By A. P. PECK, Assoc. I.R.E.

WHEN contemplating the design and construction of a "B" battery eliminator, usually called "B" eliminator, there are a good many things that must be taken into consideration. First and foremost, our greatest desire is to produce an eliminator that will operate satisfactorily and consistently and that will not give rise to any audible hum either in the phones or loud speaker, regardless of which type of reproducer is employed and regardless of how many stages and what type of audio frequency amplification is used. Then we must also have safety. It is not wise to wire up any kind of an electrical instrument to be operated from the lighting circuit, and do so in a haphazard manner. We must provide good insulation for all of the circuits used and we must guard in every way against possible short circuits, which last will be attended with at least blown fuses if not with actual danger from fire. Also, the finished "B" eliminator unit must be built with the point in view in its construction that it can be used with any radio receiving set and will not look out of place. Ease of control must also be incorporated. All of these various points have been duly considered in designing the "B" eliminator which will be described in the following paragraphs, and there is at least one novel point incorporated in this instrument which the writer has not as yet seen in any home-made eliminator. This new point is in the switch that is employed. When everything is hooked up properly, the "A" battery switch on the receiver is disregarded and the entire set is controlled by means of the snap switch placed on the panel of the "B" eliminator unit. This snap switch is connected in both the 110 volt A.C. circuit and the "A" battery circuit. More of this later.

### DOUBLE WAVE RECTIFIER TUBE

In making up a "B" eliminator, one of the most important parts of it is found to be the rectifier. There has recently appeared on the market a type of rectifying tube that can be employed for rectifying or changing both halves of the cycle of an alternating current and that will deliver a pulsating direct current on the output side that can be easily and properly filtered. The exact construction of this tube is shown in the photograph on these pages and it will be noted that the elements are cut in half so as to show the internal construction. Inasmuch as this is purely a constructional article, we will not enter into the discussion of the theory of the operation of this tube at this time. It is sufficient to say that the tube does not employ any filament that can be burned out and, therefore, with proper care it will last for a good long time. The manufacturers claim a tube life of many years, and it is almost impossible to measure the length of time that one of these tubes will last when not subjected to abnormal voltages. Inasmuch as a rectifier of this type will handle up to 300 volts, there need be no fear of harming it if the type of transformer called for in the list of parts given is employed.

In a "B" eliminator, we must have some sort of step-up transformer. This is necessary for two reasons. First, the rectifier tube employed will not operate properly at 110 volts potential and second, the voltage drop through any rectifier will be so great that if the 110 volt A.C. line is employed without an intermediate transformer, the voltage supplied by the rectifier will not be sufficient to operate the receiving set properly.




Right, Fig. 2: The rear view of the "B" eliminator with the special rectifying tube in its socket shows the placement of the various parts. To the extreme right is the transformer and to the extreme left is the choke coil. In front of the transformer is a socket to be connected to the 110-volt A.C. line.

After the current delivered by the transformer has been rectified by the tube, it is necessary to properly filter it so that the current will no longer be pulsating in character but will be as near pure D.C. as is possible to produce. It must be emphasized here that the desired results cannot be obtained with a cheap or inefficiently designed filter. If a large, well made choke coil and a high capacity condenser or group of condensers is not employed, the resulting current delivered to the set will not be sufficiently pure to give good reception results. A hum indicates in practically all cases that the filter is not correct.

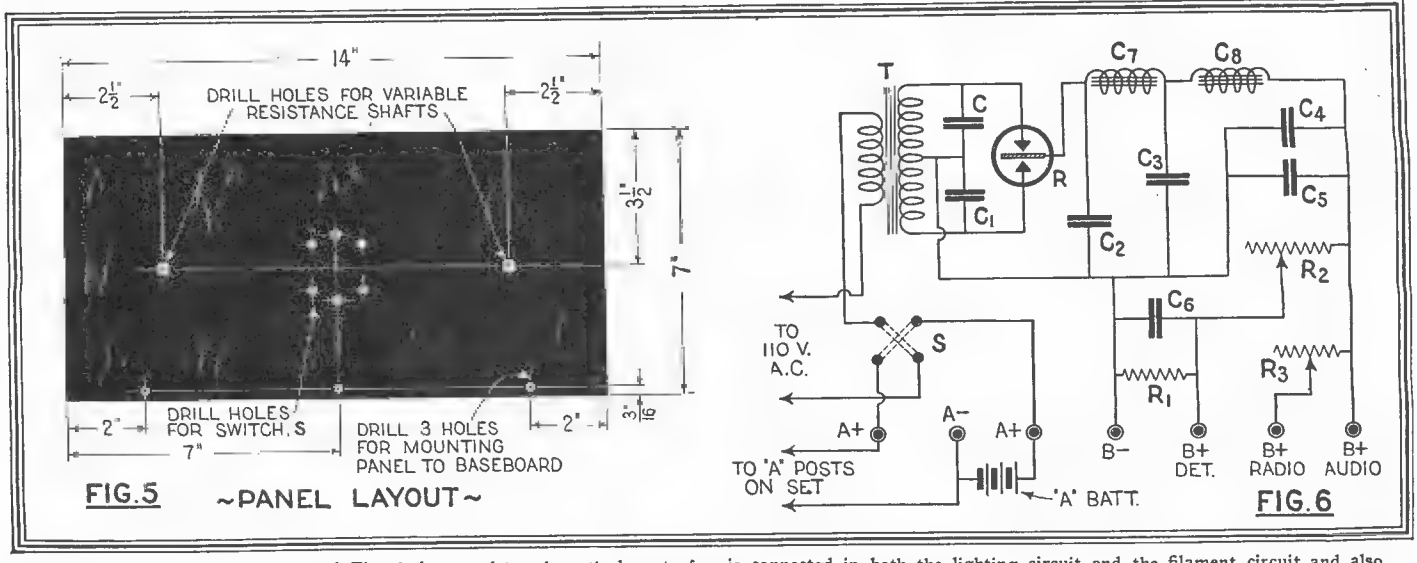



Fig. 5 shows the panel layout and Fig. 6 the complete schematic layout of the "B" eliminator. Note how the double-pole single-throw snap switch is connected in both the lighting circuit and the filament circuit and also how the negative "A" post is utilized.

www.americanradiohistory.com

### SPLIT CHOKE COIL

In the unit that is illustrated on these pages, the choke coil has an inductance of 100 henrys total and is split in the middle so that the necessary connections for the various condensers can be obtained. This type, especially designed for "B" eliminators, is now available on the market and can be obtained at a very reasonable figure.

## MATERIALS USED

*Letters correspond to those given on photographs and drawings.*
*T—Transformer, 110 volt, 60 cycle A.C. input—200 to 250 volt A.C. output.*
*C and C1—.1mf. fixed condensers.*
*C2 and C3—2mf. fixed condensers.*
*C4 and C5—4mf. fixed condensers.*
*C6—.5 mf. fixed condensers.*
*C7 and C8—two 50 henry choke coils in separate cases or in one unit.*
*R—Double wave rectifier tube.*
*R1—Fixed 7,500 to 12,500 resistance of carbon rod or wire wound type.*
*R2—Variable resistance of 10,000 to 100,000 ohms.*
*R3—Variable resistance of 1,000 to 10,000 ohms.*
*S—Double-pole single-throw indicating snap switch.*
*All fixed condensers must be tested at 500 volts.*

In order to adapt a "B" eliminator to all types of sets, there must be at least two variable output voltages. First, the voltage supplied to the detector tube must be comparatively low and this is obtained by connecting a 10,000- to 100,000-ohm variable resistance, R2, in the circuit as shown in the diagram in Fig. 6 and Fig. 7. Then again, most multi-tube receivers employing radio frequency amplification require a lower voltage for the R.F. amplifying tubes than for the A.F. amplifying tubes and this is obtained by means of the resistance R3. The voltage drops across these two resistances are ample to provide the necessary variations in voltages. By mounting the two variable resistances on the panel of the eliminator, ready control of the detector and R. F. plate voltages is obtained. The eliminator shown in the photographs in Figs. 1, 2 and 3 is now in use in the writer's laboratory, in connection with the four tube tuned radio frequency receiver described in the March issue of SCIENCE AND INVENTION Magazine. With this combination, excellent results are obtained and there is absolutely no hum. In fact, it is practically impossible for anyone to tell whether the "B" eliminator or "B" batteries are used when one is substituted for the other without their knowledge. In both cases, the operation is precisely the same and the only difference noticeable is that when the "B" eliminator is employed, the volume delivered by this set is greater than with "B" batteries. In fact, with most of the sets that have been tested, it is possible to use only the first stage of audio frequency amplification for stations operating within a radius of 200 to 300 miles. To use the second stage of amplification on nearby local stations is usually disastrous to the loud speaker.

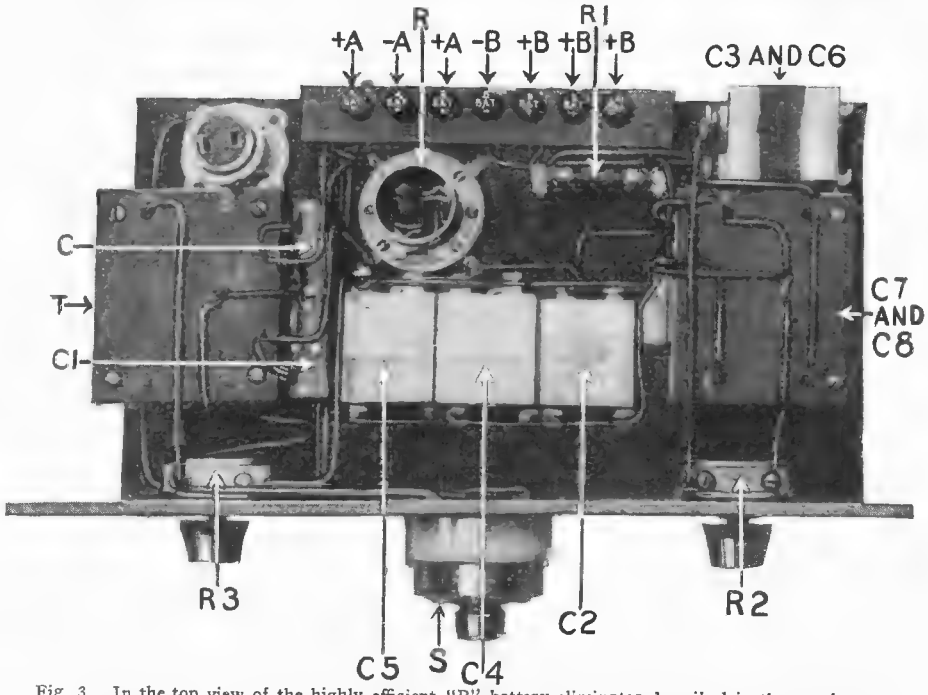
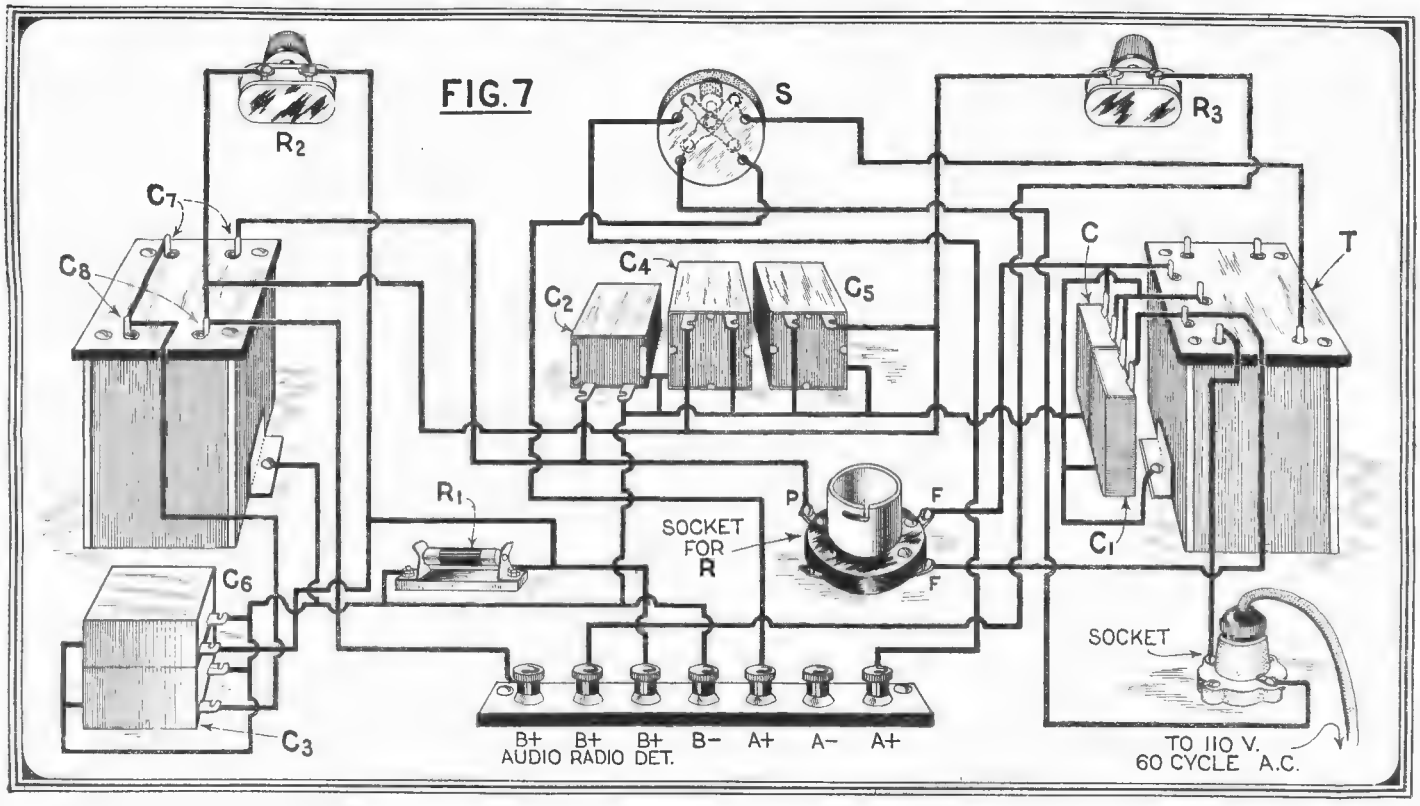



Fig. 3. In the top view of the highly efficient "B" battery eliminator described in these columns, the reader can readily perceive how every instrument is laid out on the baseboard and on the panel. This is about as compact a unit as can be easily and efficiently constructed.
*Photos courtesy General Radio Co. and Allen-Bradley Co.*

### OPERATES MULTI-TUBE SETS

A good many people want to know just

(*Continued on next page*)




In order to make the wiring of a "B" eliminator easy, we have made up a wiring diagram of all the component parts illustrated in perspective and it is reproduced in Fig. 7 above. Note that the grid connection to the socket is not used and that all metal cases connect to — B.

www.americanradiohistory.com

## How To Build a "B" Eliminator

(*Continued from preceding page*)

one thing about a "B" eliminator, after they find that it is free from hum. That is, "Will it operate a multi-tube set?" The answer for this "B" eliminator is, "Yes." It has been tried on various types of sets up to and including six tube receivers and the manufacturers of the parts and of the tube claim that it can be employed for any type of set using 12 tubes or less. Therefore, it is obvious that an eliminator of this nature will be most satisfactory for operating any of the usual receivers that are in use today.

And now, we come to the switching arrangement employed wherein a double-pole single-throw snap switch is used. One of the poles of this switch closes the 110 volt A.C. circuit through the primary transformer and the other closes the "A" battery circuit. You will notice that there are seven binding posts on the terminal block. Four of them are for the "B" potentials and the other three are for the "A" battery. The center one of these three is merely a convenience post and can be eliminated if desired, but standard binding post strips have seven holes in them, so why not use seven binding posts and have added convenience? The center post is not connected to any part of the circuit but is merely used for tying together the negative lead from the "A" battery to the eliminator and from the eliminator to the set. The exact connections will be plainly evident by reference to the circuit diagrams given in Figs. 6 and 7. Be sure that you hook this switch up properly so that

**Fig. 4. This illustration shows the rectifier tube that makes a good "B" eliminator possible. Elements are in cross section.**
*Photo, courtesy Raythcon Mfg. Co.*

the A.C. circuit and the "A" battery circuit will be completed when the switch is turned to the "on" position. Also, when reassembling the switch, after connecting up the terminals, be sure that the indicator dial is positioned correctly in relationship to the switch arms. After you have made all of these connections and run the wires from the "B" eliminator to the set, you can connect a metallic strap or a short piece of wire across the two terminals of the "A" battery switch that is incorporated in the receiver and can then turn both the "A" battery and the "B" eliminator off or on by merely turning the snap switch. In case your set employs filament control jacks, they can be disregarded as it is only necessary to leave the plug inserted in one of the jacks and turn off the snap switch which will automatically extinguish the tubes and also break the input circuit to the "B" eliminator.

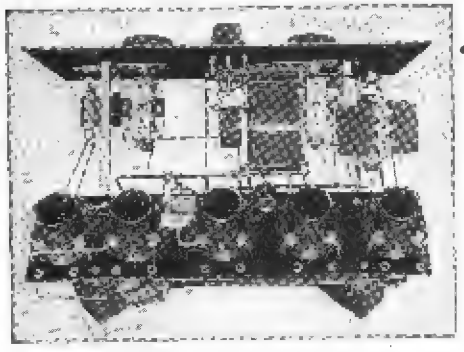
### USE INSULATED WIRE

When wiring up this unit, probably the best wire to employ is No. 14 solid conductor with a heavy layer of rubber insulation. This will effectively guard against short circuits and still is easy to bend and to use for making connections. Be sure to place a soldering lug under each instrument as it is mounted and connect all these lugs together. Also connect them to the negative side of the "B" supply as shown in Fig. 7. Then be sure that one side of the "A" battery in the receiver that the eliminator is to be used with is grounded. Taking these precautions will prevent stray electro-magnetic fields that emanate from the coils of the transformer and choke coil from affecting the inductances incorporated in the radio receiving set proper and, therefore, all possibility of any hum in the reproducing unit will be avoided.

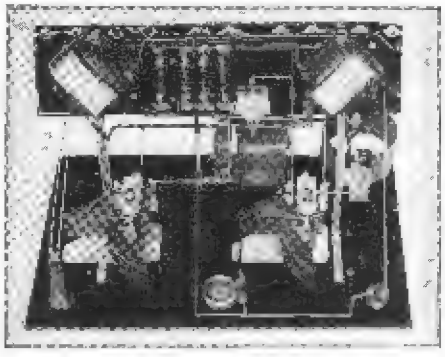
After you have placed an eliminator in operation, it may be found necessary to increase the value of the "C" battery in order

(*Continued on page* 1146)

# A Five Tube Tuned R.F. Receiver



**Above: All of the instruments mounted on special brackets and the connecting wires are plainly shown.**

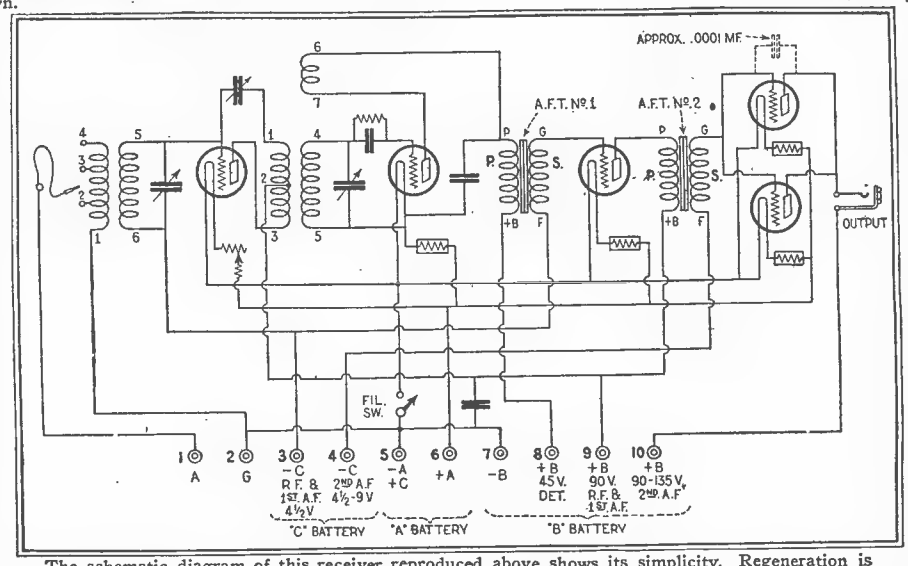


**Above: Bottom view of set described here. Transformers support sub-panel.**
*Photos courtesy Hammarlund-Roberts.*

THE general trend of the radio manufacturer today seems to be toward the exploitation of complete kits for the construction of radio receiving sets. By putting out materials in this form, the manufacturer saves the constructor a lot of work and also aids him in getting the best possible results from his particular set. In these columns we describe another receiver that has been made up from a standard kit of parts and that is exceptionally easy to build. Furthermore, this is one of the most compact five-tube receivers that is available today and that is not so "pushed together" that efficiency is sacrificed. In this particular set, there is no crowding of parts, yet there is no waste space. This is accounted for by the fact that some of the instruments are set quite far back from the panel resulting in a symmetrical and pleasing layout.

In this set, regenerative and tuned radio frequncy amplification are combined in such a manner that the best features of both of these types of amplifications are retained and some of the undesirable features of each are eliminated. As will be noted, upon reference to the schematic diagram of the set given herewith, the radio frequency amplifier is neutralized. This makes set quieter.

In order to avoid overloading the last audio frequency amplifying tube, two standard tubes of the UV-201A type are connected in parallel. If after doing this, an audio frequency whistle is found to be present, it can often be eliminated by connecting a small condenser from grid to plate of one of the last audio frequency amplifying tubes as shown in dotted lines in the circuit diagram.



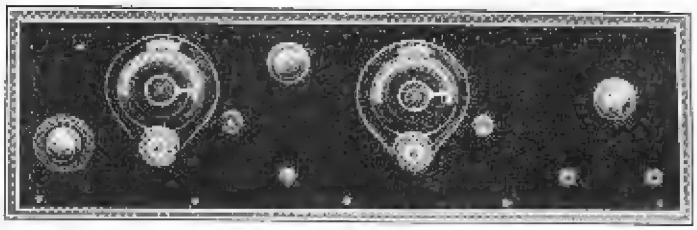

**The schematic diagram of this receiver reproduced above shows its simplicity. Regeneration is employed in the detector circuit in order to increase sensitivity, and one stage of tuned R.F. also helps. Last two tubes are connected in parallel for greater volume.**

www.americanradiohistory.com

# A Highly Efficient Six Tube Receiver

## Three Stages of Tuned Radio Frequency Amplification Gives Sensitivity and Selectivity to a Remarkable Degree

By L. ABRAMS

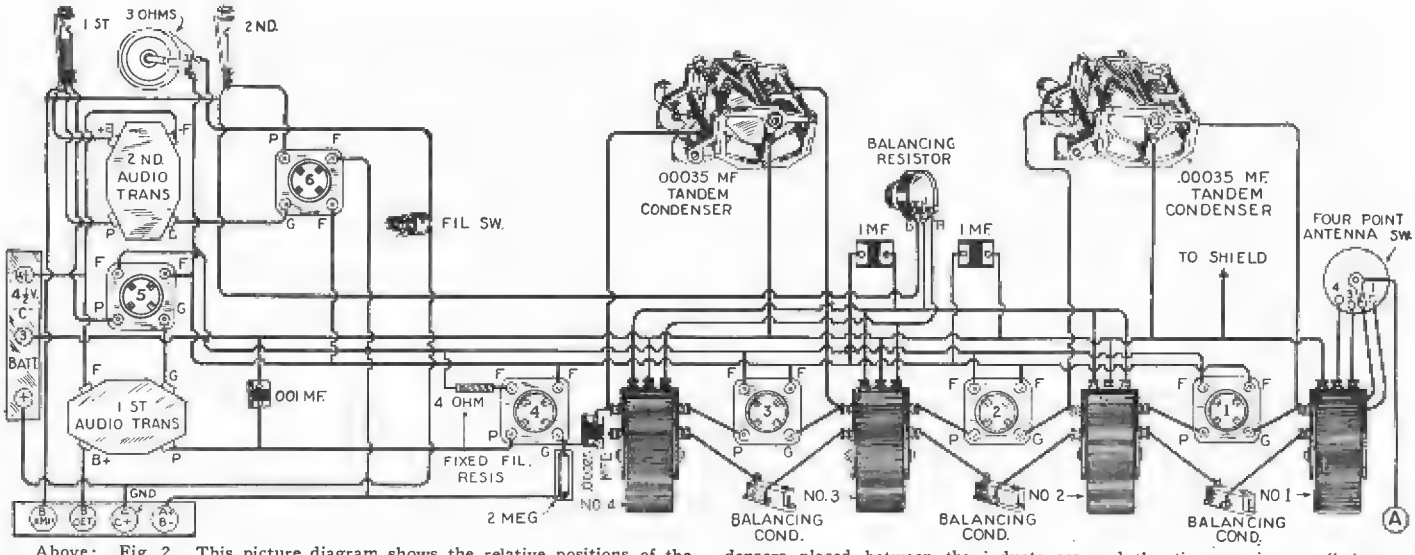


Above: Fig. 1. The panel view of this receiver shows the positioning of the two main tuning control dials and of the other variable components. Note that vernier dials are absolutely essential with this receiver if the best possible results are to be obtained.

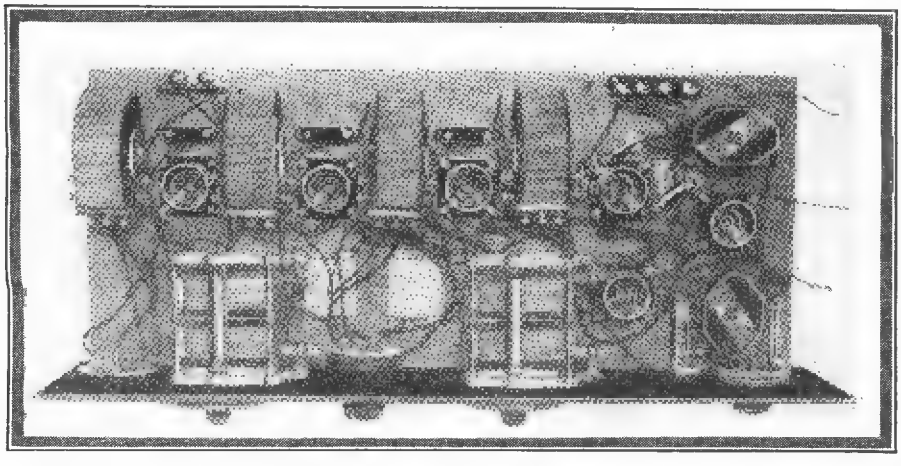
UP to the present time, the majority of manufactured and home-made receivers of the multi-tube type have been limited in scope to two stages of tuned radio frequency amplification. The addition of more stages of this type of amplification, except in Super-Heterodyne receivers has been considered by most radio men as impractical. Of course, there have been a few isolated instances where really interested experimenters have constructed sets employing three or four stages of radio frequency amplification, but usually the results were not all that could be desired. In the case of the set under discussion, however, it has been found entirely possible and practical to use three stages of tuned radio frequency amplification and to so balance the entire set that the receiver will work properly over the entire band of broadcast wavelengths and will give excellent results without the frailties usually found in multi-stage receivers.

### SHIELDING THE SET

There is one thing that we must not fail to mention in connection with this set and that is the problem of shielding. Shielding in this type of receiver is not done for the usual reason of attempting to eliminate body capacity, but rather so as to reduce interference from nearby sources and to increase the selectivity of the entire unit. If the panel and cabinet of this set is completely lined with copper or tinfoil, the wiring and coils can not pick up stray currents and so pass them on to the reproducer. Only that current which enters the receiver through the antenna will be amplified and reproduced when shielding is employed. In order to facilitate this work and to produce a satisfactory appearing set, there is a company manufacturing a complete metal panel and cabinet for housing a receiver of this nature. The panel is sold drilled and ready for the bushings that insulate the various instruments from each other and the front surface of it is engraved. Any reader desiring further information on this subject will receive the same upon request and receipt of a stamped addressed envelope.




Above: Fig. 2. This picture diagram shows the relative positions of the various instruments used in this receiver and also illustrates how the shortest leads can be made between the parts. Note the balancing condensers placed between the inductances and the tiny verniers or "trimming" condensers that are integral parts of the tuning units. The adjustment of these capacities is critical and must be carefully made.



Above: Fig. 3. The set illustrated was constructed of standard manufactured parts and wired with the flexible leads provided by the makers. With this system no knowledge of soldering is necessary and anyone can wire up a complete six tube receiver in a very few hours. The ends of the flexible leads are equipped with terminals, making connecting easy.

Because of the fact that specially designed manufactured inductances are the only ones that will give really satisfactory service in this highly sensitive receiver, we do not give the winding data on the coils. They are made in the well known toroid form and this type of inductance is extremely difficult for the average amateur to make. Therefore, it is not wise to attempt this phase of constructional work, although if the reader is particularly desirous of doing so, references can be furnished as to where constructional details are available.

### OSCILLATION CONTROLS

In the circuit diagram of this set, a balancing resistor will be noted. This is of special design although it is available on the market and consists of two resistances connected in series and arranged with two arms so positioned that as one resistance is increased, the other is decreased. This operates as a volume control as well as an oscillation control.

After this receiver has been constructed, it must be very carefully balanced and this is done by means of the three low capacity balancing condensers and the small "trimming" condensers mounted on the regulation tandem tuning condensers. When adjusting the balancing condensers for proper operation, use a long wooden or other insulating stick at least 15 inches long and sharpened at one end after the manner of a screw driver edge.

www.americanradiohistory.com

# RADIO ORACLE

In this Department we publish questions and answers which we feel are of interest to the novice and amateur. Letters addressed to this department cannot be answered free. A charge of 50c. is made for all questions where a personal answer is desired.

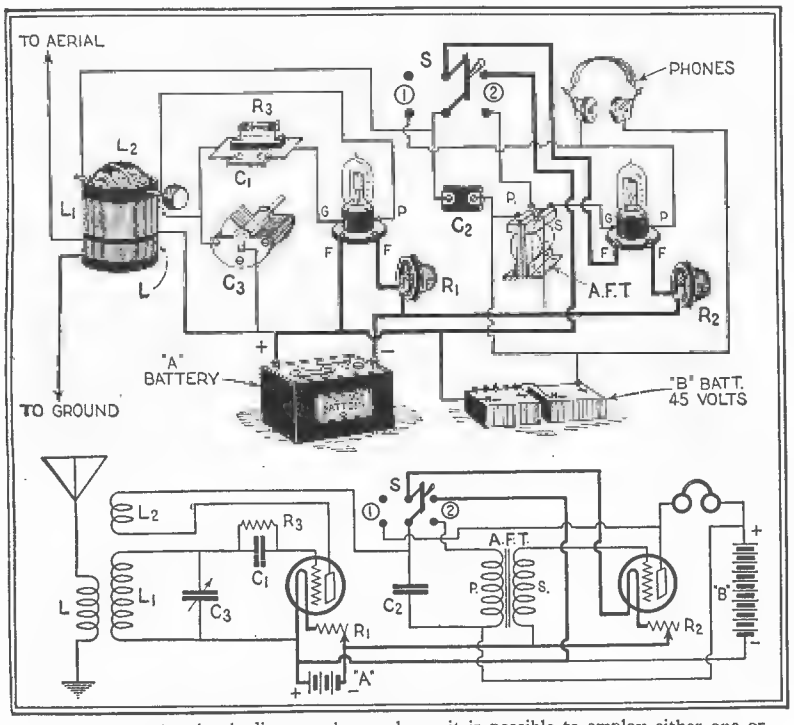



Fig. 1. With the circuit diagram shown above, it is possible to employ either one or two tubes and to automatically control the amplifier tube filament.

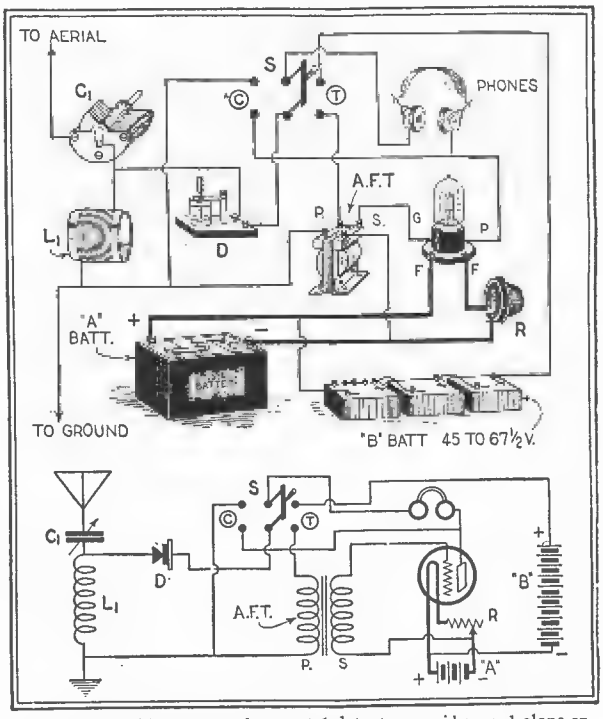



Fig. 2. With this system, the crystal detector may be used alone or by means of switch S, it may be used with an amplifier.

## DUPLEX CIRCUITS

(458) Q. 1. Albert King, Bronx, N. Y., asks: Kindly show two-circuit diagrams by means of which the following effects can be obtained. (A) Show how two tubes can be hooked up with a single double-pole double-throw switch so that either the regenerative detector tube can be used alone or so that the detector and one stage of audio frequency amplification can be employed. This should be arranged so that the filament circuit of the audio tube will be automatically extinguished when the detector is being used alone. I do not want to use jacks. (B) Show a standard single coil crystal detector circuit, with one stage of audio frequency amplification, and a double-pole double-throw switch so arranged that the crystal detector can be used either alone or with the amplifier. In this case the tube need not be extinguished automatically as this will be controlled by a push-pull switch.

A. 1. The two requested circuit diagrams are given in these columns. Referring to Fig. 1, all of the constants are standard. L, L1 and L2 are a standard three circuit tuner. C has a capacity of .00025 mf., R1 and R2 are rheostats. R3 is a 1 to 5 megohm grid leak, C2 has a capacity of .001 mf. and S is a double-pole double-throw switch. When the switch is thrown to position 1, the detector is used alone and when in position 2, both tubes are employed and the filament of the second tube is lighted.

In Fig. 2, the requested crystal circuit is shown. C1 may be a .0005 mf. condenser, L1 a standard tuning coil to cover the broadcast wave-length band, D, the crystal detector and S, the switch. At position C of switch S, the crystal is used alone and at position T, the vacuum tube is used as an audio frequency amplifier for the crystal detector. With the latter combination good quality is had with increased volume.

## "LC" TABLE

(459) Q. 1. Louis Terrin, Washington, D. C. asks: Kindly give the LC values to be used in tuning units from 10 to 500 meters. Also a list of the corresponding frequency in kilocycles of various wave-lengths.

A. 1. The table appended gives all the required information. The value LC is the product obtained by multiplying the inductance of a coil in microhenrys by the capacity of a shunt condenser in microfarads. When using this table suppose that we have a condenser with a maximum capacity of .0005 and we desire to obtain the inductance of a coil that will enable us to tune to a maximum wavelength of 200 meters with maximum condenser capacity. Referring to the table, we find that the LC value for 200 meters is .01126. Dividing this by the maximum capacity of the condenser or .0005 mf., we find that the coil to be used with this particular condenser should have an inductance of 22.5 microhenrys.

## MULTIPLE PHONE CONNECTIONS

(460) Q. 1. J. R. Cormany, Lonoir City, Tenn., says that he has a standard type of one-tube set but cannot use more than two pairs of phones in series on the set at the same time. He asks us if we can suggest any remedy for this.

A. 1. When you put more than two pair of phones in the plate circuit of your detector tube, the resistance becomes so great that your set fails to function properly. The best thing for you to do would be to obtain one of the devices on the market today which are designed to have placed therein a single reproducing unit or telephone. Four or more rubber tubes radiate from the cover of the unit and terminate in pairs of ear-pieces similar to a stethoscope. Also try connecting phones in parallel instead of in series.

## LOCATING POWER LEAKS

(461) Q. 1. J. A. Moorefield, Charlottesville Va., has had considerable trouble while operating his radio receiving set from interference probably caused by leaks in power lines. He asks how leaks of this nature can be located.

A. 1. The only practical method of locating interference of the nature you mention is to use a loop connected to a two or three tube receiver. This should preferably be of the oscillating type so as to be more sensitive to interference of the nature you mention. The outfit could then be carried around the locality where trouble is experienced and by swinging the loop, the general direction of the leak could be determined. Use the triangulation method.

### Chart for Determining the Wave-length, Frequency and LC Value for Radio Frequency Circuits

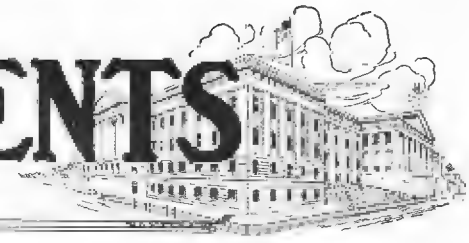
*(L is in microhenries and C in microfarads.)*

| Wave Length (Meters) | Frequency (Kilocycles) | LC Value | Wave Length (Meters) | Frequency (Kilocycles) | LC Value | Wave Length (Meters) | Frequency (Kilocycles) | LC Value |
|---|---|---|---|---|---|---|---|---|
| 10 | 30,000.00 | .0000282 | 65 | 4,615.00 | .001188 | 230 | 1,304.00 | .01489 |
| 11 | 27,273.00 | .0000340 | 70 | 4 286.00 | .001378 | 235 | 1,277.00 | .01555 |
| 12 | 25,000.00 | .0000405 | 75 | 4,000.00 | .001583 | 240 | 1,250.00 | .01622 |
| 13 | 23,076.00 | .0000476 | 80 | 3,750.00 | .001801 | 245 | 1,255.00 | .01690 |
| 14 | 21,426.00 | .0000552 | 85 | 3,529.00 | .002034 | 250 | 1,200.00 | .01760 |
| 15 | 20,000.00 | .0000634 | 90 | 3,333.00 | .002280 | 255 | 1,177.00 | .01831 |
| 16 | 18,748.00 | .0000720 | 95 | 3,158.00 | .002541 | 260 | 1,154.00 | .01903 |
| 17 | 17,646.00 | .0000813 | 100 | 3,000.00 | .002816 | 265 | 1 132.00 | .01977 |
| 18 | 16,667.00 | .0000912 | 105 | 2,857.00 | .003105 | 270 | 1,111.00 | .02052 |
| 19 | 15,788.00 | .0001016 | 110 | 2,727.00 | .003404 | 275 | 1,091.00 | .02129 |
| 20 | 15,000.00 | .0001126 | 115 | 2,609.00 | .003721 | 280 | 1.071.00 | .02207 |
| 21 | 14,284.00 | .0001241 | 120 | 2,500.00 | .004052 | 290 | 1,034.50 | .02366 |
| 22 | 13,635.00 | .0001362 | 125 | 2,400.00 | .004397 | 295 | 1,017.00 | .02450 |
| 23 | 13,042.00 | .0001489 | 130 | 2,308.00 | .004757 | 300 | 1,000.00 | .02533 |
| 24 | 12 500.00 | .0001622 | 135 | 2,222.00 | .005130 | 310 | 967.70 | .02705 |
| 25 | 12.000.00 | .0001755 | 140 | 2,144.00 | .005518 | 320 | 937.50 | .02883 |
| 26 | 11,538.00 | .0001903 | 145 | 2,069.00 | .005919 | 330 | 909.10 | .03066 |
| 27 | 11,110.00 | .0002052 | 150 | 2,000.00 | .006335 | 340 | 882.40 | .03255 |
| 28 | 10,713.00 | .0002207 | 155 | 1,935.00 | .006760 | 350 | 857.10 | .03448 |
| 29 | 10,343.00 | .0002366 | 160 | 1.875.00 | .007204 | 360 | 833.30 | .03648 |
| 30 | 10,000.00 | .0002533 | 165 | 1 818.00 | .007662 | 370 | 810.80 | .03854 |
| 32 | 9,374.00 | .0002883 | 170 | 1,765.00 | .008134 | 380 | 789.50 | .04065 |
| 34 | 8,823.00 | .0003255 | 175 | 1.714.00 | .008620 | 390 | 769.20 | .04277 |
| 36 | 8,333.00 | .0003648 | 180 | 1,667.00 | .009120 | 400 | 750.00 | .04503 |
| 38 | 7,894.00 | .0004065 | 185 | 1,622.00 | .009634 | 410 | 731.70 | .04733 |
| 40 | 7,500.00 | .0004503 | 190 | 1,579.00 | .01016 | 420 | 714.30 | .04966 |
| 42 | 7,143.00 | .0004966 | 195 | 1,538.00 | .01071 | 430 | 697.70 | .05204 |
| 44 | 6,818.00 | .0005446 | 200 | 1,500.00 | .01126 | 440 | 681.80 | .05446 |
| 46 | 6,522.00 | .0005960 | 205 | 1,463.00 | .01183 | 450 | 666.70 | .05700 |
| 48 | 6.250.00 | .0006485 | 210 | 1,429.00 | .01241 | 460 | 652.20 | .05960 |
| 50 | 6,000.00 | .000704 | 215 | 1.395.00 | .01301 | 470 | 638.30 | .06219 |
| 55 | 5,454.00 | .000852 | 220 | 1,364.00 | .01362 | 480 | 625.00 | .06485 |
| 60 | 5,000.00 | .001014 | 225 | 1,333.00 | .01425 | 490 | 612.20 | .06759 |
| | | | | | | 500 | 600.00 | .07039 |

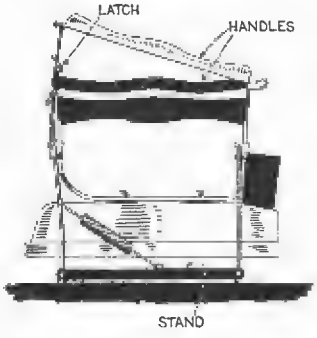
The chart for determining wave-length, frequency and LC values often comes in handy for use in various radio calculations. Clip this table out and keep it for reference.

www.americanradiohistory.com

# LATEST PATENTS



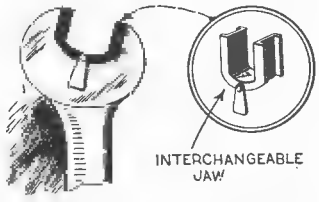
## IRON STAND




No. 1,564,517 issued to Walter Bernard Brolin is illustrated below and protects an unusual type of automatic stand for sadirons. As shown, grasping the handle of the iron folds up the stand. When the handle is released, a spring action raises the iron off the surface to position shown.

## WRENCH

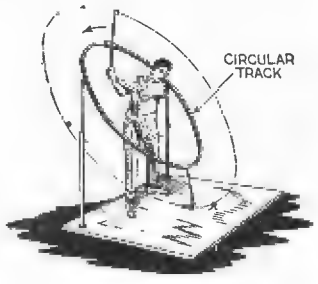
No. 1,564,222 issued to Charles L. Dunlap protects a novel type of open end wrench shown above. The jaws are interchangeable and the walls of the jaws are of varying thicknesses so that the actual openings for application to angular projections may




be changed and therefore the same handle may be continually used on various sizes of nuts merely by changing the jaws. The interchangeable part is equipped with a spring clip which frictionally engages with the handle and prevents accidental displacement of the jaws when the wrench is in use.

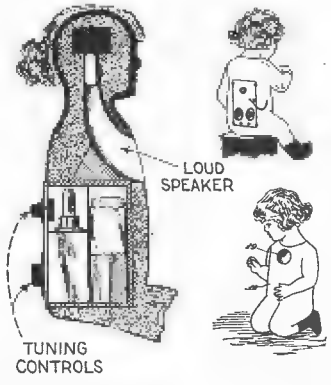
## GOLF DEVICE

No. 1,567,530 issued to Ronald G. Macnaughton and Morton R. Walker



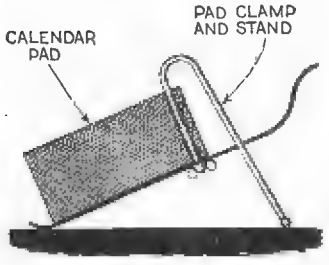

protects a device designed for the use of golf players and so constructed as to teach them to properly "follow through" their swing. The golf stick is loosely attached to a runner on a circular track so that the operator must continue his stroke.

## RADIO DOLL




No. 1,565,145 issued to Beulah L. Henry was obtained to protect the design of a combination doll and complete radio set of the type shown in the above illustration. A combination of this nature should be attractive in many ways without any detrimental effect on the operation of the set.

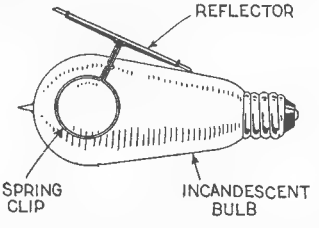
## CALENDAR PAD




No. 1,566,054, issued to Frank A. Weeks describes a very simple type of calendar pad stand illustrated above. The base is a piece of sheet metal and the pad clamp and stand is a piece of metal rod bent to the shape shown, threaded at one end and equipped with a ball or other protective tip at the other end. Thus simplicity is combined with ruggedness.

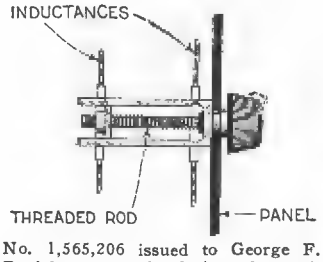
## REFLECTOR

No. 1,566,327 issued to George Johnson was allowed on the simple design for a lamp shade or reflector il-




lustrated here. A simple spring clip holds any desirable size or shape of reflector to a standard incandescent bulb.

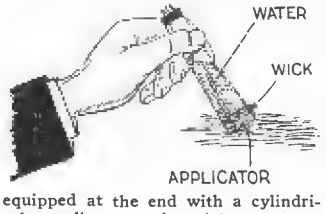
## COIL MOUNT




No. 1,565,206 issued to George F. Ruzicka covers the design of a variable mounting for different types of radio inductance coils. As shown, one inductance is stationary and the other is mounted upon a threaded rod. By turning the control knob, the distance between the two inductances can be critically varied.

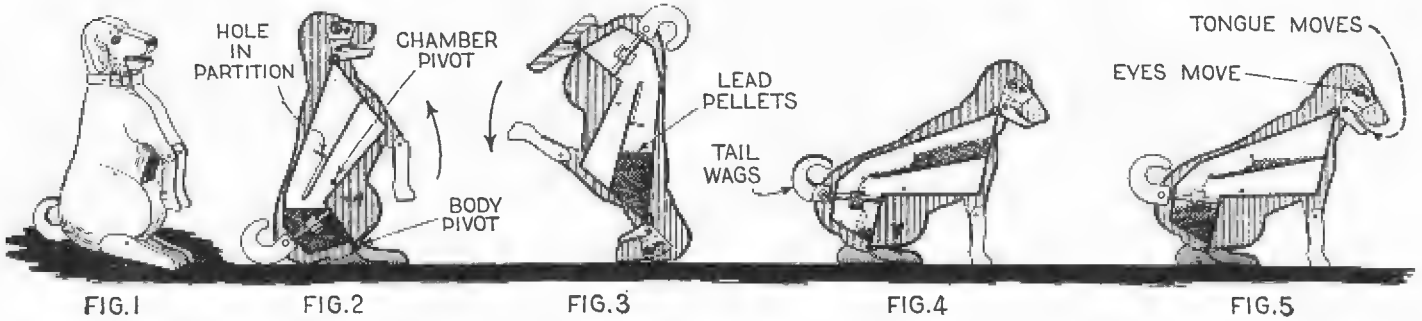
## MOISTENER

No. 1,565,979 issued to Joseph Bachrach covers the design of a moisture applicator shown above. A small tube is filled with water and is




equipped at the end with a cylindrical applicator. A wick conducts water to the surface of the applicator which is rolled over the surface to be moistened. In this way, quick and easy moistening is obtained.

## ANIMATED TOY DOG




No. 1,564,785 issued to William W. Harris describes one of the cleverest mechanical toys that has come to our attention in some time. Operating without springs or other devices that necessitate winding, this mechanical dog wags his tail, moves his eyes, lower jaw and tongue and sits up. This is all accomplished by the movement of lead pellets placed within a chamber in the dog's body. The dog is first placed upright in the position shown in Figs. 1 and 2 and then rotated in a counter clockwise direction to position in Fig. 3. It is then placed in position Fig. 4 and the lead pellets start to roll through the hole in the partition shown. Hitting projections on the tail shaft, the tail is caused to wag. As the weight of pellets in the lower end of the chamber increases, the eyes, jaw and tongue move and finally the dog, without any assistance assumes the position shown in Fig. 1. This is caused by the weight in the lower end of the chamber overbalancing the body.

NOTICE TO READERS. The above illustrated and described devices have recently been issued patent protection but are not as yet to our knowledge available on the market. We regret to advise that it is impossible to supply the names and addresses of inventors of the above devices to any of our readers. The only records available, and they are at the Patent Office at Washington, D. C., give only the addresses of the inventors at the time of application for a patent. Many months have elapsed since that time, and those records are necessarily inaccurate. Therefore, kindly do not request such information.

—EDITOR.

www.americanradiohistory.com

# Scientific Humor

### GIVING HIM THE MITTEN

CUSTOMER: "This $7.00 fountain pen you sold me for 99 cents leaks."

SALESMAN: "Ah, yes, you need one of our patented rubber writing gloves. Thirty-five cents, please."—*Leslie F. Carpenter.*

### MANY OF US DO

SHE: "I think the radio is such a wonderful invention, don't you?"

HE: "Yeah—there's one thing about it I like, anyway."

SHE: "Why, what is that?"

HE: "Well, you can listen in on the broadcasting of the Sunday school lesson on your radio, and when they announce passing of the collection plate you can just sit back and smile without even kickin' in a nickel."—*Harmon C. Shelby.*

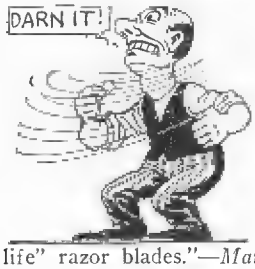
### HE'S PICKING ON THEM

REFEREE (blowing whistle): "Foul."

SPECTATOR: "Where are the feathers?"

REFEREE: "Ain't any, this is a picked team."—*Raymond Costello.*

### HE MIGHT TRY AN INK E-RAZER




"I see where Mr. Jones tried to kill himself last night by cutting his throat."

"Did he die?"

"No."

"How's that?"

"Why he used one of those new fangled "Double-life" razor blades."—*Marvin Moore.*

### A VOID

"Where I spent Christmas last year the thermometer dropped to zero."

"That's nothing."

"What's nothing?"

"Why, zero."—*Klayde Spaur.*

### RUNNING KEEPS IT WARM

WIFE: "Is it cold?"

HUBBY: "Yes, mercury's running down the thermometer to keep warm."—*Edw. E. Grathwohl, Jr.*

### RADIO OR BABY OH

BILL: "Radio is in its infancy."

JACK: "Yes, I know that by the way it howls."—*Edw. E. Grathwohl, Jr.*

### HE GOT AN AIRING

"Son, I have proved to you that anything filled with air will go up. Have you any questions to ask?"

SON: "Pop, what's keeping you down?"—*Harold Hoyt.*

### OR A DUCK ON THE SHORE

MAUD: "Dad, what is a drydock?"

DAD: "What? A drydock? Well, a thirsty surgeon, I presume."—*Martiniano Cruz.*

### AN OILY WORKER

INQUISITIVE PERSON (to boy pouring kerosene oil on a wiggler-infested pond): "And what are you doing, lad?"

LAD: "Ah, just pouring oil on troubled waters."—*Joseph Elles.*

## First Prize $3.00

### HIS OESOPHAGUS WAS HIS TEST

"I wish to commune with the spirits," stated the smart chemistry student as he stepped up to the lab. supply window to get some $C_2H_5OH$ in his test tube.

—*John H. Spicer.*

### CAUSE FOR CORNS ON THUMBS

An Automatic Lunch: Where nickels are so thin from use it looks like the Indian is riding the Buffalo.—*Ted Thompson.*

*WE receive daily from one to two hundred contributions to this department. Of these only one or two are available. We desire to publish only scientific humor and all contributions should be original if possible. Do not copy jokes from old books or other publications as they have little or no chance here. By scientific humor we mean only such jokes as contain something of a scientific nature. Note our prize winners. Write each joke on a separate sheet and sign your name and address to it. Write only on one side of sheet. We cannot return unaccepted jokes. Please do not enclose return postage.*

*All jokes published here are paid for at the rate of one dollar each, besides the first prize of three dollars for the best joke submitted each month. In the event that two people send in the same joke so as to tie for the prize, then the sum of three dollars in cash will be paid to each one.*

### WE WONDER WHAT HE SAID

FRANK: "You know, Hank, one night Bill and I were out riding and Bill was all dressed up in his best clothes. Well, along about 11:30 we got lost, but we saw a sign ahead of us and Bill said he'd climb up it and light a match to see what it said. So he did."

HANK: "And what did it say?"

FRANK: "Wet paint."—*Leonard M. Asher.*

### AN IMAGINARY NUMBER

PROFESSOR: (on entering classroom: — "Gentlemen, the subject to be discussed today is liars. How many of you have read the 6th chapter of the text?"

Evidently the entire class raised their hands.

PROFESSOR: "Good! You are the very class I wish to speak to; there is no 6th chapter."—*Joseph Milota.*

### NOT A DENTAL COLLEGE

LADY (to former Cadet of West Point): "And don't you think the drills are awful boring?"—*J. F. Harvey.*

### REINCARNATED

QUACK SIDESHOW ANNOUNCER: "On my right you will perceive Cleopatra's skull at the age of 21. The other is at the age of 35."—*Frank E. Miller, Jr.*

### NOT HARD TO BELIEVE

It is easy to believe cigarettes ruin a woman's complexion. Smoke always is hard on paint.—*R. W. Hicks.*

### NO ROOM FOR NEW IMPROVEMENTS

HE: "You must admit Man is a wonderful invention."

SHE: "Maybe so. But Woman is an improvement on that wonderful invention."

HE: "Is that so? Now I know what keeps the young men out all night."

SHE: "Why so?"

HE: "They are looking up new improvements."—*H. Ward.*

### HELPED HIM KEEP COOL

After the alarm of fire was given in a hotel, one of the guests joined his friends outside and laughed at them for being so excited. "There is nothing to get excited about," he said, "I took my time about dressing, lighted a cigarette, didn't like the knot in my necktie, so tied it over again. That's how cool I am."

"Fine," one of his friends said, "but why didn't you put on your pants?"

—*J. L. Sims, Jr.*

### EXCITING FIELDS OF FORCE

"Well!" exclaimed the judge of the short-circuit court, "What I want to know is when Watt caused Rheo Stat to walk ohm, where did Volt meet 'er?"

"Just as she had crossed the magnetic field, I saw the motor pick her up, your Honor," replied the lightning arrester of the Electro Motive force.

"Then," said the judge, as he turned to the man who was charged with animal magnetism, "I will give you thirty days behind the bus-bars, and if that fails to transform you, I am going to kill-a-Watt."—*Patrick J. Lynch.*

### WHEN AN APPENDIX IS CUTE

DOCTOR: "I think you have acute appendicitis."

FLAPPER: "Oh Doc, ain't you the flatterer."—*W. B. Grant.*

### CURRENT EVENTS

SON: Father, why does a woodpecker usually peck on telephone poles?

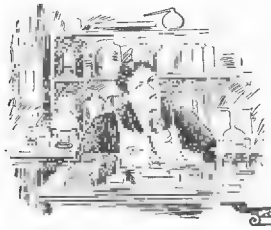
FATHER: I suppose they are looking for the currents.—*Leland Ludeke.*

### TWO WAYS AT ONCE

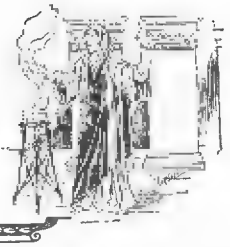
MOTHER: (searching in drawer) "I can't find a single pin anywhere. Where do they all go anyhow?"

SON: "It's hard to tell, because they are pointed in one direction and headed in another."—*Jack D. Purves, Rep. No. 25765.*

www.americanradiohistory.com



# THE ORACLE



The "Oracle" is for the sole benefit of all scientific students. Questions will be answered here for the benefit of all but only matter of sufficient interest will be published. Rules under which questions will be answered:

1. Only three questions can be submitted to be answered.
2. Only one side of sheet to be written on; matter must be typewritten or else written in ink; no penciled matter considered.
3. Sketches, diagrams, etc., must be on separate sheets. Questions addressed to this department cannot be answered by mail free of charge.
4. If a quick answer is desired by mail, a nominal charge of 50 cents is made for each question. If the questions entail considerable research work or intricate calculations, a special rate will be charged. Correspondents will be informed as to the fee before such questions are answered.

## LOCOMOTIVE HISTORY

(2019) Q. 1. Francis P. Otery, Philadelphia, Penna., asks for some information on the history of locomotives.

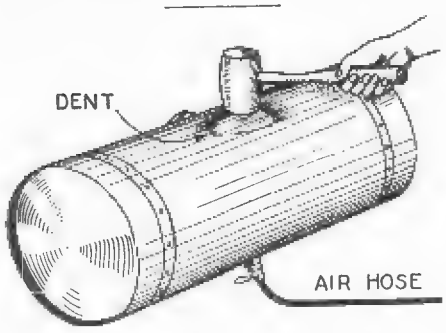
A. 1. The original locomotive was not designed for operation on rails such as we know today, but really might be considered as the forerunner of the automobile inasmuch as it was designed to run on common roads. The first record found of the application of a locomotive to rails gives that honor to Richard Trevitheck who, in 1804 in England, is said to have used the first locomotive in existence. This engine, however, is said to have made only one or two trips and was commercially a sad failure. In 1811, a locomotive was built in England by Mathew Murray which operated by a toothed wheel engaging with a toothed rail. Some histories credit George Stephenson with the invention of the locomotive but our records show that his first practical engine was completed in 1814.

Prior to 1830, several locomotives had been in use in America but they were of English manufacture and had been imported from that country. In the year 1830 a locomotive was designed by Adam Hall, built in New York City and operated on the Baltimore and Ohio Railroad. This seems to be the first record available of an American built locomotive.

## EXPLORING HIGH ALTITUDES

(2020) Q. 1. Raymond Williams, Stanford, Conn., says that he has often read of scientific observations dealing with the intensity of cold and air conditions that have been found at heights as great as 10 miles. He asks: How are such observations made when the highest airplane flight has not even reached the eight mile mark?

A. 1. The various observations that you mention are sometimes made by fastening registering instruments to captive balloons and allowing them to rise to the greatest possible heights. The instruments work automatically and ma' records of such phases of the condition of the upper strata of air as humidity, temperature, air pressure and light. Often the balloons used are not of the captive type, but are set free and allowed to rise upward until they burst due to the reduced atmospheric pressure and the pressure of the gas within them. The instruments carried by th balloon are equipped with small parachutes by means of which they float gently to the earth, whereupon they are recovered and their records made permanent. The instruments are, of course, protected from injury by various methods. The different types of instruments used for observation work of this nature are very small in dimensions and in some cases, it is necessary to read the records made by them with the aid of a microscope. By means of certain methods employed, it has been possible to obtain records at elevations as much as 14 miles above the surface of the earth.

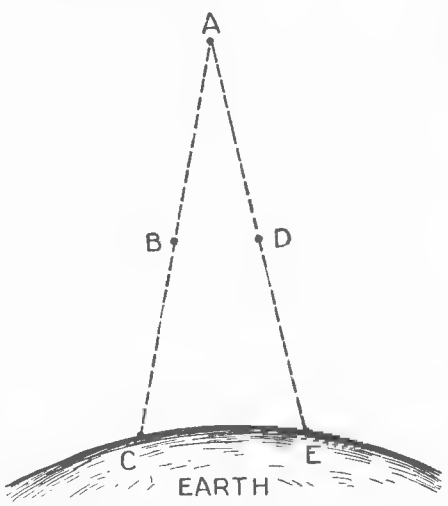



An excellent method of straightening out dents in a tank is shown above.

## REMOVING DENTS

(2021) Q. 1. Edward Ross, Philadelphia, Pa., wants to know how dents can be removed from the sides of an automobile gasoline tank.

A. 1. Probably the simplest method of accomplishing this work rapidly and effectively is to remove the tank from the automobile and fill it with water. Then connect a petcock screwed into the bottom of the tank to a compressed air supply of 20 pounds pressure. If now the edges of the dent are gently tapped with a lead or a wood faced mallet, the dent will usually be found to spring out and leave the tank quite smooth. Sometimes a strip of heavy tin can be soldered to the center of the dent, and by pulling on it the plac' can be straightened out.




A very interesting problem in relative speeds is that shown above. There are several ways of approaching this problem and of discussing it to a satisfactory conclusion and one of these methods is gone into in detail below.

## SPEED

(2022) Q. 1. Lester Morris, Hooker, Oklahoma, presents a purely hypothetical question regarding the appearance of a luminous body traveling from space toward the earth at a speed twice that of light. He asks: Will a person situated on the surface of the earth be able to see this body as it approaches?

A. 1. Leaving all factors out of the situation other than the body and the earth, and assuming that the body has a uniform speed of double that of light, this question can be readily answered as follows by referring to the diagram given in these columns. Assume that the body is traveling toward the earth along a line indicated by ABC and that it will strike the earth at a point C. Furthermore, assume that the observer is at point E. Points C and E can be considered as being so close together that the resulting discrepancy in calculations will have little bearing upon the actual result. Let points A and B and B and C be 186,000 miles apart. The same of course is true of AD and DE. Assuming this self-luminous body to be at point A, it will be two seconds after it reaches this point before the observer will see it in that location. This is because of the fact that it will take the light two seconds to travel the distance AE. In the meantime, however, the body has moved from A to B, consuming only one-half second of time, whereas the light has taken one second to travel this same distance. The light of the body when at B or its equivalent position D will take only one second to reach the point E and since the body has passed from A to B in one-half second, it is obvious that it will be seen at position B before it is seen at A. Therefore, at least for the space shown, the body will appear to an observer to be traveling outward into space or from B to A, rather than from space toward the earth or from A to B and its apparent speed will be one-half that of light. Of course, it must be realized that in this explanation round figures only are assumed. However, this has little bearing upon the actual solution which will remain the same even under careful calculations. There will be other discrepancies entering into this proposition such as the distance BE being different from that assumed in the proposition, which distance is DE. Here again, however, the final result is not affected. Of course, the entire problem is pure theory and has no practical application but it is a good example of an unusual physics problem.

## PHYSICS PROBLEM

(2023) Q. 1. C. C. Flanders, Des Plaines, Ill., refers to Scientific Problems And Puzzles article appearing in the October, 1925, issue of SCIENCE AND INVENTION Magazine and refers specifically to Fig. 7 of that article. Quoting from his letter, "You say the motor rotates at a constant speed. The only effects that I can see would be to reduce the load on the motor by shortening the string or increase the load by making the string longer. The statement regarding constant speed of course prevents us from figuring that the machine speeds up or slows down, and, therefore, the only thing that I can see is that the load on the motor changes. Am I correct?"

A. 1. Your query has been forwarded to the author of the article mentioned, Ernest K. Chapin, and his reply is given here.

"To make certain that no mistake has been made in this solution I set up the apparatus as illustrated and found that the ball behaved as I predicted. That is, the ball speeded up as its radius of gyration was shortened and the cord actually wound up on the stem supporting the ball. That the load on the motor was altered I do not doubt, but this was negligible so that I considered that the rotor was turning at practically a constant rate. If I have not satisfied you in this matter, let me hear from you again concerning it."

## TATOOING

(2024) Q. 1. Everell Reed, Viola, Wis., asks for some general information on tatooing and how it is done.

A. 1. The method of performing this work resolves itself down to a mere puncturing of the skin and the introduction of some colored pigment into the punctures. The latter heal, the ink remaining under the skin and visible. Black India or colored inks are usually employed as the pigments, the water soluble type being commonly used.

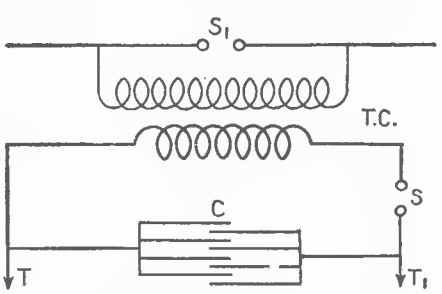
## RECTIFIER

(2025) Q. 1. Ed. Jones, Fresno, Calif., asks how much current a small pint size electrolytic rectifier can pass and also asks for some general information on the same type of rectifier.

A. 1. This small electrolytic rectifier cannot be depended upon to pass more than 1 ampere of current. The electrodes should be at least 1½ inches apart, although this distance is not critical. The aluminum plate goes to the positive of the battery. A saturated solution of borax is to be employed allowing any excess of the chemical to settle before the solution is placed in the rectifier.

## TESLA COIL

(2026) Q. 1. Frank Spencer, Dayton, Ohio, asks for a standard circuit diagram showing how to connect up a Tesla coil with the required apparatus.




The circuit diagram for connecting a Tesla coil is simple and is shown above.

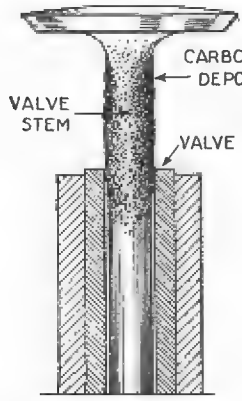
A. 1. The circuit diagram in these columns shows how this is accomplished. In this diagram, the terminals T and T1 connect to the secondary of a transformer supplying from 5,000 to 20,000 volts. A condenser, C, is connected across or in parallel with these terminals and the primary of the Tesla coil, TC, and the spark gap, S, are connected in series with each other across this condenser in parallel therewith, as shown. The secondary of the Tesla coil is connected to a spark gap, S1, or to any other terminals that may be desired.

www.americanradiohistory.com

## STICKING VALVES

(2027) Q. 1. J. H. Baldwin, Rochester, N. Y., asks: What causes the valves, particularly the exhaust valve, of a gasoline engine to stick open when the engine is in operation?

A. 1. This is usually caused by either a warped or faulty valve stem or a heavy deposit of carbon that has collected on the stem as shown in the diagram here. When this carbon deposit becomes quite heavy it stops the valve from moving up and down in the guide and therefore, of course, it




When the valves in an internal combustion engine tend to stick and do not seat properly, the trouble may be due to a carbon deposit on the valve stem as shown at the left or to a warped stem. The remedy for the carbon deposit is scraping.

sticks. If this is the only cause for sticking, it can be removed by scraping the valve stem free of the deposit. If, however, the stem is warped in the least, it is advisable to install a new valve.

## WEATHER FORECASTING

(2028) Q. 1. Leonard Price, New York City, asks: Can you give me some information regarding the making of devices that will change color due to changes in atmospheric conditions?

A. 1. It is known that a leaf of blotting paper or a strip of fabric made to change color according to the hygrometric state of the atmosphere has been employed for weather indications in place of a barometer. The following compound is recommended for this purpose: One part of cobalt chloride, 75 parts of nickel oxide, 20 parts of gelatin, and 200 parts of water.

A strip of calico, soaked in the following solution, will appear green in dry weather, but when moisture is present, the color disappears.

| | |
|---|---|
| Copper chloride | 1 part |
| Gelatin | 10 parts |
| Water | 100 parts |

The following is a method of making old-fashioned weather glasses containing a liquid that is supposed to cloud or solidify under certain atmospheric conditions:

| | | |
|---|---|---|
| Camphor | 2½ | drachms |
| Alcohol | 11 | drachms |
| Water | 9 | drachms |
| Sal ammoniac | 38 | drachms |
| Saltpeter | 38 | drachms |

Dissolve the camphor in the alcohol and the salts in the water and mix the solutions together. Pour in test tubes, cover with wax after corking and make a hole through the cork with a red-hot needle, or draw out the tube until only a very small hole remains. It is said that when the camphor appears soft and powdery, and almost filling the tube, rain with south or southwest winds may be expected; when crystalline, north, northeast, or northwest winds with fine weather may be expected; when a portion crystallizes on one side of the tube, wind may be expected from that direction. Fine weather: The substance remains entirely at bottom of tube and the liquid perfectly clear. Coming rain: Substance will rise gradually, liquid will be very clear, with a small amount of the solid in motion. A coming storm or very high wind: Substance partly at top of tube, and of a leaf-like form, liquid very heavy. These effects are noticeable 24 hours before the change sets in. In winter: Generally the substance lies higher in the tube. Snow or white frost: Substance very white and small starlike portions in motion. Summer weather: The substance will lie quite low. The substance will lie closer to the tube on the opposite side to the quarter from which the storm is coming. The instrument is nothing more than a scientific toy and is absolutely not to be relied upon.

## LUMINOUS MATERIALS

(2029) Q. 1. Raymundo de Souza Santos, Philadelphia, Pa., asks: Can you give several formulas for the preparation of luminous materials that can be used for experimental purposes?

A. 1. The illuminating power of the phosphorescent masses obtained by heating strontium carbonate or barium carbonate to a white heat with sulphur is considerably increased by the addition, before heating, of small quantities of the nitrates of uranium, bismuth or thorium. Added to the calcium formula, these nitrates do not heighten the luminosity or phosphorescence. The product from strontium sulphide is more luminous than that of the barium compound. Among the best luminous paints are the following:

1. One hundred parts, by weight, of strontium carbonate; 100 parts, by weight, of sulphur; 0.5 parts, by weight, of potassium chloride; 0.5 parts, by weight, of sodium chloride; 0.4 parts, by weight, of manganese chloride. The materials are heated for three-quarters of an hour to one hour, at about 2,372 degrees F. The product gives a violet light.

2. One hundred parts, by weight, of strontium carbonate; 30 parts, by weight, of sulphur; 2 parts, by weight, of sodium carbonate; 0.5 parts, by weight, of sodium chloride; 0.2 parts, by weight, of manganese sulphate. The method of treatment is the same as in the first; the phosphorescence being deep yellow.

3. Sixty parts, by weight, of strontium thiosulphate; 12 parts, by weight, of a 0.5 per cent. acidified alcoholic solution of bismuth nitrate; 6 parts, by weight, of a 0.5 per cent. alcoholic solution of uranium nitrate. The materials are mixed, dried, brought gradually to a temperature of 2,372 degrees F. and heated for about an hour. The phosphorescence is emerald green.

4. Twenty parts, by weight, of calcium oxide (burnt lime), free from iron; 6 parts, by weight, of sulphur; 2 parts, by weight, of starch; 1 part, by weight, of a 0.5 per cent. solution of bismuth nitrate; 0.15 parts, by weight, of potassium chloride; 0.15 parts, by weight, of sodium chloride. The materials are mixed, dried and heated to 1,300 degrees C. (2,372° F.). The product gives a violet light.

To make these phosphorescent substances effective, they are exposed for a time to direct sunlight; or a mercury lamp may be used. Powerful incandescent gas light also does well, but requires more time of exposure.

## BURNS

(2030) Q. 1. O. E. Bergstrom, Roseau, Minn., asks several queries regarding electrical burns.

A. 1. We have referred your various queries regarding the treatment of burns to our Staff Medical Expert, and his composite reply is given below:

"The burns you have described is evidently a second to a third class burn and the best method of treatment is in the application of picric acid. This is slightly antiseptic and allays the pain incident to all these types of burns.

"Lately, medical men have had a great deal of success in excising the necrotic areas and then resorting to skin grafts when necessary, although grafting was only required in a few cases as the healing took place very readily after the necrotic tissue had been removed.

"There is no reason why a Dakin irrigation would not be effective, but it surely would be no better than the old method of using soap and water or boracic acid.

"There is always a danger of infection from a severe burn and a great danger of auto-intoxication. This, however, should be over in five to six days, but has occasionally persisted for twice this period. A prompt epidermization prevents absorption of a toxic substance formed during the injury. An injection of digalen can be practiced and coffee or other stimulants given. Water should be drunk freely to aid elimination. Morphine is occasionally given, but in cases of shock, care must be taken that the blood pressure is not further lowered. The main idea in preventing pain is to exclude air from the burn. This, of course, means that dry dusting powders or oils are generally placed over the area of the wound. At the same time, excluding the air interferes greatly with the plans of management in accordance with antiseptic precautions. We believe that picric acid dressings would be superior to a Dakins solution.

"Sodium bicarbonate has been used successfully, and olive oil on thick muslin bandages is excellent. A mixture of linseed oil and lime-water well shaken is often used by chemists for laboratory burns."

REPORTER

Science and Invention

CORRESPONDENT REPORTER'S IDENTIFICATION NO. 10000

THE BEARER OF THIS CARD L. H. Gladney IS AN AUTHORIZED CORRESPONDENT-REPORTER OF SCIENCE and INVENTION MAGAZINE THE PUBLISHERS OF SCIENCE AND INVENTION WILL APPRECIATE ANY COURTESY EXTENDED THEIR REPRESENTATIVE.

EXPERIMENTER PUBLISHING CO.

(over)

IN ORDER to present to the public the very latest scientific details, SCIENCE AND INVENTION maintains a large staff of field reporters. Any one of our readers is eligible to join this staff and, upon request, a reporter's card will be forwarded, together with complete instructions for gathering material. The reporter's card is illustrated above, and its use will gain admittance to many places that would otherwise be closed to the ordinary person. You need not have any special ability to obtain one of these cards other than a desire to help others to gain knowledge.

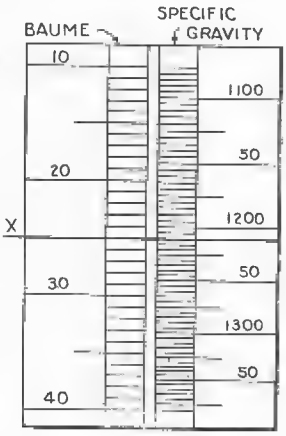
Address Field Editor, SCIENCE AND INVENTION.

Submitted manuscripts cannot be returned unless accompanied by postage.

## BAUME SCALE

(2031) Q. 1. Victor Townsley, Clayton, La., asks us to show the relationship between the Baumé scale and the specific gravity scale as applied to ascertaining the condition of the electrolyte in a storage battery.

A. 1. The diagram given here will show how the two compare. The scale that we have shown is calibrated from 1.100 to 1.350 on the specific gravity side and these figures for specific gravity are included within a space of 10° to 40° Baumé. This applies to the Baumé scale for liquids heavier than water. There is another scale of the same name for liquids lighter than water.




The relationship between the Baumé scale for liquids heavier than water and the specific gravity scale is shown at the right. For instance, at point x, a specific gravity of 1210 is equivalent to approximately 25° Baumé.

## BATTERY CHARGER

(2032) Q. 1 Frank Wiesuski, Oglesby, Ill. says that he has a vibrating type of battery charger designed to charge at 4 amperes. He asks: How can I increase the charging rate to 6 amperes?

A. 1. This is rather impractical inasmuch as it would involve rebuilding the entire charger. However, you may be able to increase the charging rate slightly by careful adjustment of the vibrator. Do this with an ammeter in the circuit so that the exact change of the rate can be noted.

Q. 2. The needle of my charger meter formerly did not return to zero when the current was turned off. Instead it returned only to the 1 ampere mark. I bent the needle slightly so that it would return to zero but then found that when the charger was operating, the needle only read 3 amperes. Does this indicate that the battery is charging at only 3 amperes?

A. 2. Undoubtedly it does. Possibly, however, there is something wrong with your ammeter and in any event, the cheap types of meters that are furnished on the average battery charger are not as accurate as they might be. The ammeter readings are often as much as 25% inaccurate.

## SMOKE DISSIPATION

(2033) Q. 1. Edward J. Lake, Clatskanie, Ore., asks: Can chemicals be used for precipitating the solid material in coal or wood smoke?

A. 1. It would be practically impossible to obtain any results which would be commercially valuable by the use of chemicals for separation of the solid material found in coal or wood smoke. Static electricity excitation has been used to precipitate this solid material and excellent results have been obtained in this manner. In many cases the fine dust from the smoke contains valuable constituents, which are extracted.

Q. 2. What is used in gas masks for filtering out the harmful ingredients of various poisonous gases?

A. 2. The composition through which air is breathed in gas masks is usually made up of some kind of charcoal. That formed by the ignition of peach pits was used to a very great extent in the gas masks issued to our army in the recent war. Other substances are also used; new gases present new problems for the mask-makers.

## INK

(2034) Q. 1. J. Strothman, Brooklyn, N. Y., asks for a formula for a good grade of black ink and also requests directions for making the same heavier or lighter, according to the use to which it is to be put.

A. 1. Try a formula such as the following, increasing the alcohol content, if necessary, to produce a thinner ink. The formula is:

| | |
|---|---|
| Nigrosin | 3 parts |
| Water | 15 parts |
| Alcohol | 15 parts |
| Glycerine | 70 parts |

It will be necessary to thin this mixture and you should experiment with water and alcohol until the desired result is obtained.

## DIAMONDS

(2035) Q. 1. J. K. Waterbury, Woodland, Idaho, asks: What is the size of the largest diamond that has ever been mined?

A. 1. The largest stone of this nature of which we have any record is the so-called Cullinan diamond mined in South Africa in 1905. It was about as large as an average sized man's fist and weighed a pound and a half.

www.americanradiohistory.com

# "Your radio is always top notch. What do you do to keep it so full of pep?"

KEEPING your "B" batteries full of pep, without frequent renewals, is simply a matter of using the right size Evereadys for your particular set with a "C" battery*.

The rule which determines the right size "B" batteries to use is so simple no one can make a mistake, and once learned it definitely settles the question of "B" battery service and economy.

*On 1 to 3 tubes — Use Eveready No. 772.*
*On 4 or more tubes — Use the Heavy Duty "B" Batteries, either No. 770, or the even longer-lived Eveready Layerbilt No. 486.*
*On all but single tube sets —Use a "C" battery.*

When following these rules, No. 772, on 1 to 3 tube sets, will last for a year or more, and Heavy Duties on sets of 4 or more tubes, for 8 months or longer.

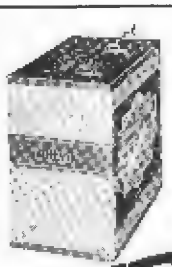
These life figures are based on the established fact that the average year-round use of a set is 2 hours a day.

A pair of Eveready No. 772's for a 5-tube set instead of 2 Eveready No. 770's or 2 Eveready Layerbilts No. 486—looks at first glance like an economy because of lower first cost. But in a few months the 772's will be exhausted and have to be replaced. After the same length of time the Eveready No. 770's or the Eveready Layerbilts No. 486 will still be good for many more months of service.

We have prepared for your individual use a new booklet, "Choosing and Using the Right Radio Batteries," which we will be glad to send you upon request. This booklet also tells about the proper battery equipment for use with the new power tubes.

*NOTE: In addition to the increased life which an Eveready "C" Battery gives to your "B" batteries, it will add a quality of reception unobtainable without it.

*Manufactured and guaranteed by*
NATIONAL CARBON CO., Inc.
New York San Francisco
Canadian National Carbon Co., Limited
Toronto, Ontario



LEFT—*No. 486, for 4, 5 or more tubes.* $5.50.

RIGHT—*Eveready Dry Cell Radio "A" Battery, 1½ volts.*

**EVEREADY**
**Radio Batteries**
***—they last longer***

Tuesday night means Eveready Hour—9 P. M., Eastern Standard Time, through the following stations:

WEAF—*New York*
WJAR—*Providence*
WEEI—*Boston*
WTAG—*Worcester*
WFI—*Philadelphia*
WGR—*Buffalo*
WCAE—*Pittsburgh*
WSAI—*Cincinnati*
WEAR—*Cleveland*
WWJ—*Detroit*
WGN—*Chicago*
WOC—*Davenport*
WCCO { *Minneapolis* / *St. Paul*
KSD—*St. Louis*
*Pacific Coast, Eveready Program,*
KGO—*San Francisco, 8 to 9 P. M.*

www.americanradiohistory.com

# WARNING!

**You can't become an Electrical Expert without this thorough training**

I have trained 16,000 men in my big schools. And I know how long it will take you to become an electrical expert.

I know what every electrical school in America offers its students. And I have proved that my way of teaching electricity is the right way!

I don't promise you a big-pay electrical job 30 days after you enroll for my course. But—

No matter what proposition any other electrical school offers you I'll guarantee to give you more and better training for the same money!

I wouldn't dare print such a guarantee unless I could back it up. But everybody knows that National's Electrical Course is the most thorough of its kind. Famous instructors train you. You use as few books as possible. Work right with the instructors on a half-million dollars worth of new electrical equipment. Learn by doing.

**I Help You All Through Your Life!**

When you enroll for my course you are entitled to stay in this big school all your life. You can take part of my course—for many of my departments are as complete as some schools' full courses!—and come back years later to take the rest, at no extra cost. I don't rush you through half-trained. National stands behind you all through your life to help you to learn more and earn more.

When you train at National you are right in the heart of California's tremendous hydro-electric development. Hundreds of big-pay jobs now open right here.

**With National Training You Know MORE than Other Men**

How can you hope to be a foreman or superintendent — or hold any other big-salaried electrical job—unless you know more than the other men? National-trained men do know more!—And I'll help you land a real job at real pay!

**My Free Book Tells the Truth**

Don't be misled by promises. Get my free book of facts. It tells the Truth about the electrical industry. Learn about by sensational Lifetime Scholarship—the greatest proposition ever offered any man who seriously wants to learn electricity right and earn real money. Every statement I make here is backed by 21 years' experience teaching men like you. I guarantee my training. And if you want to be a real Electrical Expert instead of a "half-baked dub" you'll mail this coupon for my free book and learn the facts before you decide.

# NATIONAL
## Electrical School
**Dept. 553, 4004 So. Figueroa St., Los Angeles, California**

I want to know how to make BIG MONEY in Electrical Work. Send your FREE book.

Name.....

Address.....

City..... State.....


## Tarrano the Conqueror

By RAY CUMMINGS

(*Continued from page* 1105)

He persisted; but his voice was gentle and earnest. "Soon we will be at my home, Lady Elza. And now—there are some things I would like to say while I have the opportunity. . . You will listen?"

"Yes," she said; and tried to keep from him the trembling within her. "I'll listen, of course."

He nodded. "Thank you. . . . My Elza, you have heard me talk of conquering the world. My dream—my destiny. It will come to pass, of course. Yet—" A smile pulled at his lips. "Do you know, my Elza, what you and I are doing now?"

She stared, and he did not wait for her to answer.

"We're making my first retreat. I wonder if you can realize how I feel, having to admit that? Tarrano in retreat! . . . Our escape from Venia? Pouf! That was a jest. I was there on Earth merely to get you, and the Brende model. I had no thought of conquering the Earth just then. I accomplished my two purposes—and left . . . . It was not a retreat, merely a planned departure.

"But this, my Elza, is very different. I did not wish to do what I am doing now. I had planned—I had thought, had actually hoped, that I might maintain myself in the Great City. You see, I tell you this, little girl, because—well I am a lonely man. I walk alone—and because I am human—it does me good to have someone to talk to. I had hoped I might maintain myself in the Great City. Last night—at the start of the Water Festival—I began to realize it was impossible. I should have enlisted the *Rhaals*—the men of Science, Elza. But I had no time, and they are very aloof. I could have won them to me had I tried." He shrugged. "I must confess I was over-confident of my strength—the strength of my position. The *Rhaals* stayed out of the affair—stayed in their own city, which has always been their policy. That was what I expected, but now I see I should have had their aid. I did—well what I did to guard against the unhappy outcome you witnessed—what I did was wrongly planned. You see, I take all the blame. I alone am responsible for my destiny. There are some who in defeat cry bitterly, 'Luck! That cursed luck was against me!' Not so! Leadership is not a matter of luck. Destiny is what you make it. You see?

"And so now I am making my first retreat. A set-back, nothing more. I shall launch my forces from the City of Ice, instead of marshalling them from the Central State as I had planned. And Mars is still mine. I still control Mars, little Elza. . . . A set-back just now— and it bothers me. It hurts my pride—and as you know, my Elza, Tarrano is very proud."

She had been listening to him, her fingers plucking idly at her robe. He bent closer to her; his voice turned tender. "I was thinking that perhaps—just perhaps you would scorn Tarrano in his triumphs, you might feel differently toward him now—in his first retreat. Do you?"

She forced her eyes up to his again. "I'm —sorry—from your viewpoint, I mean—that things are going wrong."

He smiled gently. "You are very conservative, Lady Elza. You want very much to avoid hypocrisy, don't you?"

"Yes," she said frankly. "You could hardly expect me to be sorry at your defeat."

"Defeat?" He rasped out the word, and his laugh was harsh. "You are too optimistic. Defeat? Things going wrong? That is not so. A slight setback. A strategic retreat—and in a week I will have regained more than I have lost. . . Oh, Lady Elza! I who would now—and always —be so gentle with you—why we are almost quarreling! That is not right. For the lives of a thousand of my servants, I would not have used that tone to you just now. Forgive me. . . .

"I was saying, my Elza—could not you feel more kindly to me now. A little hope from those gentle eyes of yours—a little word from those red lips—a word of hope for what some day might be for us—you and me—"

She dared to try and turn the subject. "You mentioned the Brende model—where is it? Have you it in the Cold Country?"

He frowned. "Yes. And I will use it—for you and me alone. You've always known that, haven't you? Just for you and ne, my Elza." He took her hand. "Won't you try and love me—just a trifle? Is it really so hard?"

She did not move. "I—don't know." Then she faced him squarely. "I do not love you, Tarrano." Something in his eyes —a quality of pleading; a wistful smile upon his lips—suddenly struck her as pathetic. Strange and queerly pathetic that such a man as he should be reduced to wistfullness. Emotion swept her. Not love. A feeling of sympathy; a womanly desire to lighten his sorrow; to sympathize and yet to withhold from him the happiness he sought.

"I do not love you, Tarrano. But I do respect you. And I am sorry—"

"Respect! I have told you I can command that from everyone. But love—your love—"

"I would give it if I could, Tarrano."

"You mean—you're trying to love me—and cannot?"

"I mean—Oh, I don't know what I mean, save that I do not love you yet."

He smiled. "I think you speak the truth when you say you do not know what you mean. Your love! If I had it, I should know that I would have it always. But—having it not—" He was very sincere, but his smile broadened. "Having it not, my Elza, there is no power in all the Heavens that can tell me how to get it. It may be born in a moment from now—or never. Who can tell?"

She was silent; and after a moment, he added; "Enough of this. I would ask you just one thing. You are not afraid of me, are you?"

"No," she said; and at that moment she meant it.

"I would not have you ever be afraid, Lady Elza. Love is not conceived by fear. And you must know I could never force my love upon you. For if I did—I should withhold forever the birth of this love of yours which is all I seek—this love I am trying to breathe into life. . . Enough!"

He did not mention the subject again. For hours—eating what meager stock of tabloid food with which their vehicle was provisioned — they flew onward. Rising now to top the line of jagged mountains. Over them the platform swept. In the crisp air the snow down there gleamed blue-white; the ice with an age-old look filled the valleys between the peaks.

The arctic! It was nothing like the Polar regions of Earth. Stark desolation. A naked land seemingly upheaved by some gigantic cataclysm of nature, lying tumbled and broken where it had fallen in con-

(*Continued on page* 1138)

www.americanradiohistory.com

## LUMINOUS PAINT

**Make Your Watches, Clocks, Etc., Visible by Night** The very latest discovery in the scientific world. Hitherto, practically unobtainable except at an exorbitant price, we have at last succeeded in producing this remarkable LUMINOUS PAINT, which, applied to the surface of any article, **emits rays of white light**, rendering it **perfectly visible** in the dark. **THE DARKER THE NIGHT, THE MORE BRILLIANT IT SHINES.** Quite simple to use. Anyone—you can do it. A little applied to the dial of your watch or clock will enable you to tell the time by night. You can coat the push buttons or switch plates of your electric lights, match boxes, and innumerable other articles; make your own Luminous Crucifixes, Luminous Rosaries, etc. Bottle containing sufficient to coat several small articles, **Price 25c.** Larger sizes **50c** and **$1** postpaid. **Johnson Smith & Co., Dept. 342, Racine, Wis.**

## The "Little Giant" Typewriter

**A First Class Writing Machine For $1.50**

A perfect little typewriter for $1.50. There are thousands of persons who would like to use a typewriter, but whose needs and business do not warrant the expense attached to the purchase and use of a fifty or seventy-five dollar machine. To such persons we confidently recommend our Little Giant. It is strongly made, but simple in construction, so that anyone can quickly learn to operate it, and write as rapidly as they would with pen and ink. The letters of the alphabet are so grouped as to enable one to write rapidly, the numerals most frequently used are so grouped as to enable one to write rapidly, the numerals 1 to 10, and the punctuation marks being together. With this machine you can send your best girl typewritten love letters, address envelopes, make out bills, and do almost any kind of work not requiring a large, expensive machine. With each typewriter we send a tube of ink and full printed instructions for using the machine. **Price complete $1.50 by mail postpaid to any address in the world.**

## Every Boy His Own Toy Maker

Greatest boys' book written. Tells how to make a Pinhole Camera, a Canoe, model Railroad, a Telephone, Photographing Telegraph Instrument, Box Kite, Talking Machine, Microscope, Electric Motor, Electric Door Bell, Water Wheel, Paddle Raft, a pair of Skis, a Dog Sled, Bird House, Rabbit Yard, etc. 64 pages, 150 illustrations. **PRICE, 10c postpaid; 3 for 25c.**

## GOLD TEETH

You know how fashionable it is to have gold crowns—if you can afford it. These gold-finished shells fasten over your real teeth and look like very wealthy fillings. Can be slipped on and off in an instant. Get some and surprise your friends. **PRICE 6 Cents Each, 3 for 15c, or 50c for 1 doz. postpaid.**

**JOHNSON SMITH & CO., Dept. 342, Racine, Wis.**

## U. S. BABY TANK

**25 Cents**

**It goes with real Yankee Pep—by its own power**

Most remarkable Toy ever invented. By drawing the Tank backward, either with the hand or over the floor or table and then placing it down, it will crawl along, overcoming all obstacles in the same life-like manner as the larger Tank that proved so deadly in the great war. What makes it go is somewhat of a mystery, for there is no mechanism to wind up as is usually understood with mechanical toys, yet this tank will keep plodding along ten times longer than the ordinary run of toys. It will perform dozens of the most wonderful stunts; it will go backward or forward at will. 2¼ inches long. **Price only 25 cents prepaid.**

## STAGE MONEY

With a bunch of these bills, it is easy for each person of limited means to appear prosperous by flashing a roll of these bills at the proper time and peeling off a genuine bill or two from the outside of the roll, the effect created will be found to be all that can be desired. **Prices, postpaid: 40 Bills 20c, 120 for 50c, or $3.50 thousand postpaid.**

## Wonderful X-Ray Tube

A wonderfullittle instrument producing optical illusions both surprising and startling. With it you can see what is apparently the bones of your fingers, the lead in a lead pencil, the interior opening in a pipe stem, and many other similar illusions. A mystery that no one has been able to satisfactorily explain. **Price 10c, 3 for 25c, 1 dozen 75c. Johnson Smith & Co.**

## Good Luck Ring

**Quaint and Novel Design**

A VERY striking and uncommon ring. Silver finish, skull and crossbone design, with two brilliant, flashing gems sparkling out of the eyes. Said by many to bring Good Luck to the wearer, hence its name, **Good Luck Ring.** Very unique ring that you will take a pride in wearing. **ONLY 25 CENTS.**

## Exploding Cigarettes

**JUST LIKE ORDINARY CIGARETTES, BUT SUCH REAL STARTLERS!** The box contains ten genuine cigarettes of excellent quality. They appear so real, but when each cigarette is about one-third smoked, the victim gets a very great surprise as it goes off with a loud **BANG!** A great mirth provoker yet entirely harmless. **Price 25c per box.**

## Popular Watch Charms

**15c ONLY**

**3 for 40c; $1.35 doz.**

Very pretty little curiosities and decidedly novel. Fitted with Magnifying Lenses that enlarge the pictures to a very surprising degree; in fact, it seems almost incredible that a clear picture could be possible in such a small compass, and how sharp and distinct they show up when you look through. Come in assorted views—Actresses, views of Panama Canal, Lord's Prayer in type, etc.

## CIGARETTE MAKER

Roll your own and save money. Makes them better and quicker besides saving more than half. Use your favorite brand of tobacco. Efficient, useful and handy. Pocket size, weighs ½ oz. Made entirely of metal, nickel-plated. **Price 25c postpaid.**

## MAGIC FLUTE

**Wonderfully Sweet Toned and Musical**

The Magic Flute, or Humanatone, is a unique and novel musical instrument that is played with nose and mouth combined. There is just a little knack in playing it which, when once acquired after a little practice will enable you to produce very sweet music that somewhat resembles a flute. There is no fingering, and once you have mastered it you can play all kinds of music with facility and ease. When played as an accompaniment to a piano or any other musical instrument, the effect is as charming as it is surprising.

**Post Paid 25c**

## Novelty Badges

*Kissing Permit 10c* *Garter Inspector 10c*

Two very novel metal badges, nickel plated, that you can wear, giving you fun out of all proportion to their trifling cost. **10c, each badge, 3 for 25c, or 75c per doz. p.pd.**

## BLANK CARTRIDGE PISTOL

**Price $1.00 Postpaid**

This well made and effective Pistol is modelled on the pattern of the latest type of Revolver, the appearance of which alone is enough to scare a burglar, whilst, when loaded, it will probably prove just as effective as a revolver with real bullets, without the danger to life. It takes the standard .22 Calibre Blank Cartridges, that are obtainable most everywhere. Even the most timid women can use it with perfect safety and frighten a thief without risk to herself or anyone else. **A Great Protection Against Burglars, Tramps and Dogs.** You can have it lying about without the danger attached to other revolvers. We sell large numbers around the 4th of July. Well made of solid Metal. **PRICE ONLY $1.00 Postpaid. Blank Cartridges 22-cal., shipped by express only, 50c per 100. Johnson Smith & Co., Dept. 342, Racine, Wis.**

## Sneezing Powder

Place a very small amount of this powder on the back of your hand and blow it into the air, and everyone in the room or car will begin to sneeze without knowing the reason why. It is most amusing to hear their remarks, as they never suspect the real source, but think they have caught it one from the other. Between the laughing and sneezing you yourself will be having the time of your life. For **parties, political meetings, car rides,** or any place at all where there is a gathering of people, it is the **greatest joke out. Price 10c, or 3 for 25c**

## Mystic Skeleton

**10c ppd.**

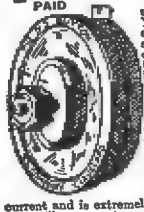
A jointed figure of a skeleton 14 in. in height, will dance to music and perform various gyrations and movements while the operator may be some distance from it.

## Serpent's Eggs

Box contains 12 eggs. When lit with a match, each one gradually hatches itself into a snake several feet long, which curls and twists about in a most life-like manner. **Price per box 10c ppd.**

## Microphone Transmitter Button

**$1.00 POSTPAID**



You can easily make a highly sensitive detectophone by using this Transmitter Button to collect the sound waves. You can build your own outfit without buying expensive equipment. It is simple and inexpensive. You can install an outfit in your home and hear conversations being held all over the house. You can connect up different rooms of a hotel. This outfit was used by secret service operatives during the war. It is being used on the stage. It is ultra-sensitive and the greatest invention in micro-phones. You can mount the button almost anywhere—card board boxes, stove pipes, stiff calendars, on the wall behind a picture frame, etc. Button is so light and small it cannot be detected. Persons can be overheard without suspecting it. You can listen in on conversations in another room. A deaf person in the audience can hear the speaker. Connected to phonograph, piano or other musical instrument, music can be heard hundreds of feet away. Button may be used to renew telephone transmitters; often makes an old line "talk-up" when nothing else will. The ideal microphone for radio use; carries heavy current and is extremely sensitive. Amplifies radio signals. Counteracts other similar uses will suggest themselves. Experimenters find the Button useful for hundreds of experiments along the lines of telephones, amplifiers, loud speakers, etc. Many fascinating stunts may be devised, such as holding the button against the throat or chest to reproduce speech without sound waves. $5.00 is given to anyone who sends in a new suggestion for the use of the Button providing the manufacturers find it suitable for use in their literature. **PRICE $1.00 POSTPAID ANYWHERE.**

## BOYS! BOYS! BOYS!

## THROW YOUR VOICE

Into a trunk, under the bed or anywhere. Lots of fun fooling the teacher, policeman or friends.

## THE VENTRILO

a little instrument, fits in the mouth out of sight, used with above for Bird Calls, etc. Anyone can use it.

**Never Fails. A 32-page book on ventriloquism, and the Ventrilo, ALL FOR 10c postpaid.**

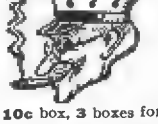
## ANARCHIST BOMBS

One of these glass vials dropped in a room full of people will cause more consternation than a limburger cheese. The smell entirely disappears in a short time. **10c a Box, 3 Boxes for 25c**

## INVISIBLE INK

**The most confidential messages can be written with this Ink, for the writing MAKES NO MARK.** Cannot be seen unless you know the secret. Invaluable for many reasons. Keep your postals and other private memorandums away from prying eyes. Great fun for playing practical jokes. **Only 15c Bot!**

## ITCHING POWDER



This is another good practical joke; the intense discomfiture of your victims to everyone but themselves is thoroughly enjoyable. All that is necessary to start the ball rolling is to deposit a little of the powder on a person's hand and the powder can be relied upon to do the rest. The result is a vigorous scratch, then some more scratch, and still some more. **10c** box, **3** boxes for **25c** or **75c** per doz boxes postpaid.

## MIDGET BIBLE

**GREAT CURIOSITY**

Smallest Bible in the world. Size of a postage stamp. **200 Pages.** Said to bring good luck to the owner. A genuine work of art. Must be seen to be appreciated. Make good money selling them to friends, church acquaintances, etc. PRICE **15c** each, **3** for **40c, 12** for **$1.35, 100** for **$7.50.** Also obtainable in Leather Binding, with gold edges. **Price 50c each, 3 for $1.25, $4.50 per doz. Magnifying Glass** for use with Midget Bible. **15c**

## LOOK 35¢ Look

**Wonderful Instrument.** Greatest thing yet. Nine separate articles in one. Everybody delighted with it. Odd, curious and interesting. Lots of pleasure as well as very useful. It is a double Microscope for examining the wonders of nature. It is also an Opera Glass, a Stereoscope, a Burning Lens, a Reading Glass, a Telescope, a Compass, a Pocket Mirror, and a Laryngascope—for examining eye, ear, nose and throat. It is worth all the cost to locate even one painful cinder in the eye. Folds flat and fits the pocket. Something great—you need one. Don't miss it. Sent by mail, postpaid. **Price, only 35c or 3 for $1.00** postpaid.

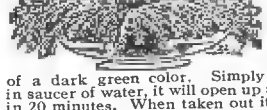
## K. K. K.

Everything about the **Ku Klux Klan** told in a clear, fearless manner. Book tells all How it started and was suppressed in 1871—The New Ku Klux Klan—How organized—How members are enrolled—Oath of the Klan—**Questions for Candidates**—Creed—Objects of the Order—Obedience—Fidelity—Pledge of Loyalty—**Ku Klux Klan and the Masons**—The Jews—The Masons—Real K. of C. Oath—The Negro Ku Klux Klan, etc., etc. Latest and most complete book on the Klan published. **Price, 35c,** postpaid.

## SEX INDICATOR

Hold the **MAGIC INDICATOR** over a man's hand—instantly it moves in a straight line, backward and forward. Hold it over a woman's hand and it describes a complete and continuous circle. The same action can be obtained over a letter written by a man or woman, etc. It is fascinating; baffling. We have never been able to figure out how it's done—but we've never seen it fail. Many novel and entertaining feats may be performed with the Sex Indicator. For example, similar results can be obtained with animals, cats, dogs, rabbits, over birds, chickens, canaries, etc. Also used to predetermine the sex of chickens and birds, etc., in fact it is sold as a patented egg tester in Europe. **Price 25c, or 3 for 65c, postpaid.**

## RESURRECTION PLANT



One of the most wonderful plants known. Possesses the strange power of turning in a few minutes from an apparently lifeless, dry herb to a BEAUTIFUL LIVING FERN-LIKE PLANT of a dark green color. Simply place the plant in saucer of water, it will open up and start to grow in 20 minutes. When taken out it will dry up and go to sleep until placed in water again. Fine house plant—summer or winter. **10 cents each or 3 for 25c,** postpaid.

## Agents Wanted

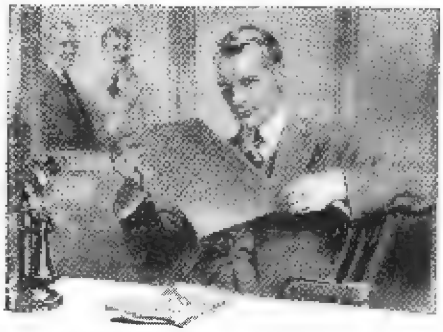
*A DeLuxe Edition of our new* **1926** *CATALOG mailed on receipt of 25c. Handsome cloth binding. Only book of its kind. 450 pages of all the latest tricks in magic, the newest novelties, puzzles, games, sporting goods, interesting books, curiosities in seeds and plants, etc., unprocurable elsewhere.*

**ADDRESS ORDERS FOR ALL GOODS ON THIS PAGE TO**

# JOHNSON SMITH & CO. DEPT. 342, RACINE, WIS.

*Postage Stamps Accepted*


www.americanradiohistory.com



# "I wish we had more men like him"

**"I've given him two promotions in the last year and he's made good each time.**

**"I always feel safe in moving him up because I know that he's preparing himself to handle bigger work.**

**"The International Correspondence Schools keep me advised of the progress he is making and I've encouraged him to keep on. His spare-time studying certainly has made him a valuable man to this firm."**

Why don't *you* study and get ready for promotion too? We'll be glad to help you if you will only make the start. And the way to do that is easy.

Choose the work you like best in the coupon below; then mark and mail it to the International Correspondence Schools today. This doesn't obligate you in the least, but it will bring you information that will help to start you on a successful career. This is your opportunity. Don't let it slip by.

***Mail the Coupon for Free Booklet***

**INTERNATIONAL CORRESPONDENCE SCHOOLS**
Box 6237-D, Scranton, Penna.

*Oldest and largest correspondence schools in the world*

Without cost, please tell me how I can qualify for the position or in the subject *before* which I have marked an X:

**BUSINESS TRAINING COURSES**

| | |
|---|---|
| ☐ Business Management | ☐ Salesmanship |
| ☐ Industrial Management | ☐ Advertising |
| ☐ Personnel Organization | ☐ Better Letters |
| ☐ Traffic Management | ☐ Show Card Lettering |
| ☐ Business Law | ☐ Stenography and Typing |
| ☐ Banking and Banking Law | ☐ Business English |
| ☐ Accountancy (including C.P.A.) | ☐ Civil Service |
| ☐ Nicholson Cost Accounting | ☐ Railway Mail Clerk |
| ☐ Bookkeeping | ☐ Common School Subjects |
| ☐ Private Secretary | ☐ High School Subjects |
| ☐ Spanish ☐ French | ☐ Illustrating |

**TECHNICAL AND INDUSTRIAL COURSES**

| | |
|---|---|
| ☐ Electrical Engineering | ☐ Architect |
| ☐ Electric Lighting | ☐ Architects' Blueprints |
| ☐ Mechanical Engineer | ☐ Contractor and Builder |
| ☐ Mechanical Draftsman | ☐ Architectural Draftsman |
| ☐ Machine Shop Practice | ☐ Concrete Builder |
| ☐ Railroad Positions | ☐ Structural Engineer |
| ☐ Gas Engine Operating | ☐ Chemistry ☐ Pharmacy |
| ☐ Civil Engineer | ☐ Automobile Work |
| ☐ Surveying and Mapping | ☐ Airplane Engines |
| ☐ Metallurgy ☐ Mining | ☐ Agriculture and Poultry |
| ☐ Steam Engineering ☐ Radio | ☐ Mathematics |

Name.....

Street Address..... 6-26-25

City..... State.....

Occupation.....

*If you reside in Canada, send this coupon to the International Correspondence Schools Canadian Limited, Montreal*



## Amaze Your Friends With Chemical Tricks

The Boy's Hand Book of Chemistry

Price 15 Cents

Write secret letters with invisible ink; pour blue, brown and black liquid from a glass of water; make a magic pitcher of bluing; make your own magic writing paper, your own ink and dyes. It's all easy if you have Chemcraft Junior—the pocket Chemical outfit. Get yours now. Order right away and get a FREE Copy of The Boy's Handbook of Chemistry; 100 pages of experiments, formulae, interesting chemical information, money - making suggestions and catalog of supplies.

CHEMCRAFT JUNIOR CHEMICAL OUTFIT with 25 experiments

THE PORTER CHEMICAL CO. 107 Washington, Hagerstown, Md.

BOTH 25¢ POSTPAID


Insure your copy reaching you each month. Subscribe to SCIENCE & INVENTION—$2.50 a year. Experimenter Publishing Co., 53 Park Pl., N. Y. C.

## Tarrano the Conqueror

(*Continued from page* 1136)

vulsive agony; and then congealed forever in a grip of ice.

The Sun hung level as the vehicle advanced. In these latitudes it would swing sidewise in a slow, low arc, to dip again below the horizon and vanish. Here in the Cold Country it was morning of the Long Day. Summer!

On over the crags and glaciers Tarrano guided their frail flying platform. Houses occasionally showed now—huts of ice, congealed dwellings, blue-white in the flat sunlight.

And then at last, over the horizon came the ramparts of a city. The City of Ice. The size of it—the evidences of civilization here in this brittle land of deadly cold—made Elza gasp with wonderment.

### CHAPTER XXIV

### THE ATTACK ON THE PALACE

I must take you back now to the Water Festival and the events in the Great City which followed it. Slaans in murderous frenzy were plunging through the throng of erstwhile revelers. Maida could not quell them. The revolt which she had started against Tarrano seemed now a self-created monster to destroy us all.

But there were Earth-men among us. A hundred of them, no more. They had come from Washington that same day; had landed, I learned later, secretly near the Great City, sent with our Earth-Council's plans to communicate with Maida. Beneath the water, coming individually, they had entered the festival; and helping Maida's girls (the diving girls whom I had encountered) they had made away with most of Tarrano's guards.

In those first moments of frenzy, I got to the balcony—joined Maida and Georg. Elza was gone! My heart went cold, but in those hurried, frantic moments, grave disaster as it was, I did not dwell upon it.

"We must get away—back to the palace!" Georg exclaimed as I joined them.

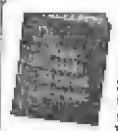
The Earth-men on the main floor were holding the Slaans partially in check. Bodies were lying in a welter—I shall not describe it. Then abruptly, upon a table a huge Slaan leaped—his garments blood-stained from his victims, a blade of dripping steel in his hands. He shouted above the tumult—words not in the Universal language, but in the dialect of the Slaans. His command carried throughout the building. Other slaans took it up; we could hear it echoed outside as others shouted it over the waters.

The bloodshed abruptly ceased. The slaans leaped away from the Earth-men, who were glad enough to let them go—rushed for the archways of the pavilion. Outside, we could hear the water splashing. Swimmers—and boats scurrying off. Then comparative silence. The scream of a slaan woman in the grove nearby, still desiring vengeance; the groans of the dying at our feet; the hiss and splutter of weapons discarded, with circuits still connected. And over it all, the great whine of a danger whistle, which some distant official had plugged. . . . A lull. And around us lay strewn stark tragedy where a few moments before had been festive merry-making. A crimson scene, with the body of the Red Woman lying like a symbol in its midst. . . .

Within an hour we were back at the palace. The whole city was seething. Boats and lights were everywhere. Control of everything seemed lost. Warning

(*Continued on page* 1143)

16 inch x 8 foot Quick Change Gear Screw Cutting Lathe



**New Lathe Catalog Free!**

Shows 96 styles and sizes from the smallest Bench Lathe to the largest Factory Production Lathe. Describes—

**The New South Bend Lathe**

a heavier, stronger Lathe of greater belt power—equal in accuracy and precision to any other Lathe made. The New South Bend Lathe sells at attractive prices—each one a remarkable value. Write for Free Catalog.

Easy Payments if Desired

**South Bend Lathe Works**
505 East Madison St., South Bend, Ind.



# ART

## We Teach COMMERCIAL ART

**Meyer Both Company, maintaining the most widely known Commercial Art Studios in the World, offers you a practical training based upon 25 years' success in producing over a quarter million drawings for leading advertisers. This attractive profession equally open to men and women. Home study instruction.**

**Get Facts Before You Enroll in Any School**

Send 4c in stamps for illustrated book telling of the success of our students.

**MEYER BOTH COMPANY**
Dept. 64
Michigan Ave. at 20th St.
CHICAGO, ILL.



**LATEST "COAST TO COAST" FULLY GUARANTEED**

# RADIO'S-10 DAYS FREE TRIAL SAVE ⅓ TO ½

Users everywhere report Miraco Radios get programs coast to coast on loud speaker; outperform sets three times as costly. Many hear foreign countries. Radio's most amazing values in unconditionally guaranteed, factory-built long distance sets—let testimony of users convince you.

MIRACO RADIO GETS 'EM COAST TO COAST

Powerful New Multi-tube Miraco gets long distance on loud speaker. Set, ONLY . . . . . $27.35 retail

FREE! Literature on latest improved 1 to 5 tube models, new low prices, testimony of users and SPECIAL OFFER. Write:

MIDWEST RADIO CORP'N
*Pioneer Builders of Sets*
409-W E. 8th St. Cincinnati, O.

AGENT USERS WANTED *Write for discounts.*



# BLACKHEADS-ECZEMA PIMPLES

**Your Skin Can Be Quickly Cleared of** Pimples, Blackheads, Acne Eruptions on the face or body, Barbers Itch, Eczema, Enlarged Pores and Oily or Shiny Skin.

**FREE** Write today for my FREE BOOKLET, "A CLEAR-TONE SKIN," telling how I cured myself after being afflicted 15 years.

**$1000 Cash says I can clear your skin of the above blemishes.**

**E. S. GIVENS, 168 Chemical Bldg., Kansas City, Mo**


www.americanradiohistory.com

# "BUILD YOUR OWN" WITH "RASCO" PARTS!

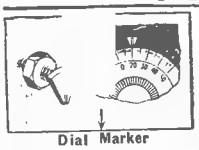
## Buy from the Oldest and Original Exclusive Radio Parts House in the United States

We pay ALL transportation charges in U. S. ALL GOODS SENT PREPAID IN 24 HOURS

Order direct from this page

**NEW PRICES FOR APRIL**

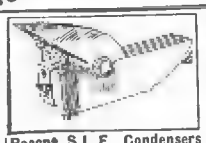
Money refunded if goods do not satisfy



**Dial Marker**

The big little thing you have been waiting for. Just drill a hole in the panel and mount the marker above the dial. Nickel plated and polished

A7788 Dial Marker, three for .....$.10

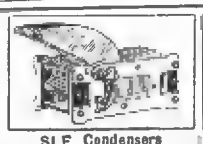


**Pacent S.L.F. Condensers**

The famous Pacent SLF Condenser. The latest word in condensers. Sturdy, compact, take up less room than most others. Minimum insulation used.

A4432 .00035 mf. 17-plate .....$2.95

A4433 .0005 mf. 23-plate ..... 3.95



**SLF Condensers**

Lowest prices ever offered. Despite this low price, these condensers are made with precision aluminum stampings, hard rubber insulation. Money back if not satisfactory.

A3513 .00025 13 pl. $1.06
A3517 .00035 17 pl. 1.20
A3523 .0005 23 pl. 1.35

**"Guaranteed" Vacuum Tubes**

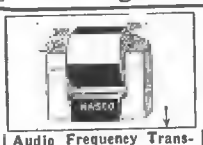
We consider the "Guaranteed" tube one of the best on the market. Any tube replaced if defective, providing filament lights. **Calibrated curve goes with each tube.**

A701A 5v. 0.25 amp. $1.25
A799 3 volt. .06 amp. 1 25

**Audio Transformer**

This is the famous Pacent Audioformer. Nickel case is grounded to base. Extra high degree of amplification. Minimum distortion and reaction. Binding posts and solder lugs. Ratio 3½ to 1.

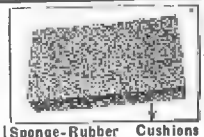
A2811 Mounted type $4.50
A2812 Unmounted .. 3.15



**Audio Frequency Transformer**

No better Transformer made. Highest class materials. Impregnated coils Silicon steel stampings used. Save 50 per cent by assembling it yourself.

A1100 Ratio 4½-1 $1.40
A1150 Ratio 6½-1 1.40

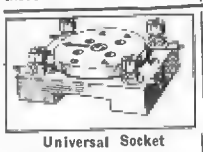


**Sponge-Rubber Cushions**

Get rid of tube noises due to vibration. Softest sponge rubber made. Size 2½"x3", ⅜" thick.

A8989 Sponge-rubber cushions, each .....$.12

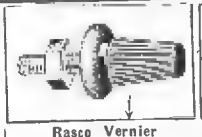
Six for ..... 0.60



**Universal Socket**

Takes new "X" type tubes as well as old standard "UV" and "C" types. Made entirely of Isolantite. No capacity effect between plate and grid. New phosphor bronze wiping contacts. Standard mounting type.

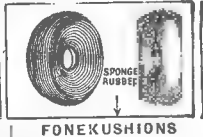
A6514 .....$0.49



**Rasco Vernier**

Why use a vernier dial when a vernier attachment will do anything and everything a vernier dial accomplishes? Cleverest vernier made. Can be used with any dial. Soft rubber ring engages dial. Nothing to come apart.

A1450 Vernier .....$0.12




**FONEKUSHIONS**

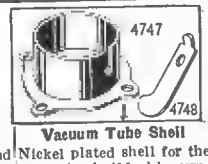
Made of sponge rubber. Make wearing your receivers a pleasure. Positively exclude all noises and make reception a pleasure. Sponge rubber will last for years. Light as a feather. Sanitary.

A3550 Fonekushions, set of two .....$0.35

**Dial Button**

Made in blue enamel and gold, to be worn in button hole. Every radio fan wants one. ¾" diameter. Best gold plate. Perfect reproduction of radio dial

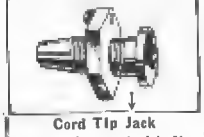
A7799 Dial Button. Each ..... $0.25




**Vacuum Tube Shell**

Nickel plated shell for the man who builds his own. 4 holes to attach to subbase. Each shell comes complete with 4 phosphor bronze socket contacts. See illus. 4748.

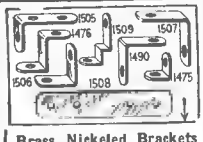
A4747 Vacuum Tube Shell and Contacts .....$0.16



**Cord Tip Jack**

Takes place of binding posts. Cord tip firmly gripped by jack. Made of brass, nickel plated. Screw to attach lead wire. No soldering necessary.

A1500 Cord tip jack, Each .....$0.15




**Brass Nickeled Brackets**

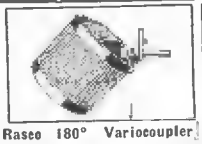
All Illustrations ¼ size.

A1505 Bracket, each $.05
A1507 Bracket, each .05
A1509 Bracket, each .04
A1476 Bracket, each .0
A1506 Bracket, each 05
A1491 Bracket, each .04
A1475 Bracket, each .03
A1508 Bracket, each .05

**Microvern**

THE vernier dial for extra sharp tuning. No backlash. Special finish permits logging of stations on dial. Beautiful appearance. Comes in gold or silver finish. State which wanted.

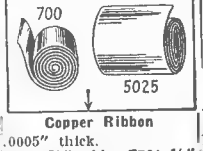
A3066 Microvern, any finish .....$1.76



**Rasco 180° Variocoupler**

Silk wire wound on bakelite tubes. Six taps. Wave length, 150 to 600 meters. For panel mounting. ¼" shaft. Your money refunded if it is not all we claim.

A3100 Variocoupler prepaid .....$1.05



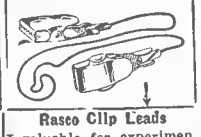

**Copper Ribbon**

.0005" thick.

F700 ⅜" wide; F701 ¼" wide; F702 3-16" wide. All sizes per foot...$0.01

**Copper Foil**

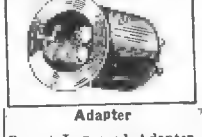
.001" thick. 4" wide. A5025 Copper Foil, per foot .....$0.10. 10-foot length ..... 0.80



**Rasco Clip Leads**

Invaluable for experimental work. Clip lead hooks in a jiffy onto any wire, binding post or conductor. Safest experimental connection. Brass clips, 1 foot silk wire, green or red.

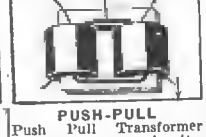
A7887 Clip leads, ea.$0.12
Dozen lot ..... .....1.35



**Adapter**

Pacent Improved Adapter. Takes 199-type tubes. Fits standard 201A sockets. Phosphor bronze springs, short circuits impossible. Bakelite molded.

A6521 Adapter $0.36



**PUSH-PULL**

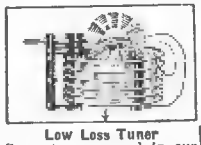
Push Pull Transformer for many new circuits. See any radio magazine. Made of best materials. Coils impregnated. Silicon steel laminations. Save 50 per cent by assembling yourself. Simple instructions furnished.

A1159 Push-Pull Transformer, ratio 6¾ to 1 $2.95

**Hard Rubber Panels**

Highest dielectric strength as per Bureau of Standards. Beautiful high finish.

| | | |
|---|---|---|
| A7100 | 7x10x3-16" | $0.65 |
| A7120 | 7x10x3-16" | 0.79 |
| A7140 | 7x14x3-16" | 0.89 |
| A7180 | 7x18x3-16" | 1.15 |
| A7210 | 7x21x3-16" | 1.31 |
| A7240 | 7x24x3-16" | 1.43 |



**Low Loss Tuner**

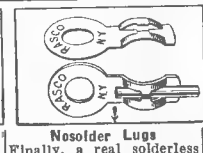
Same type as used in our LOLOS EXPLORER. Tunes from 200 to 600 meters. Hard rubber insulation throughout. Silver plated primary. Secondary D. C. C. Tickler silk insulated wire.

A2690 Tuner .....$5.00

**"T" Wire Connectors**

This big little article solves all troubles when making "T" wire connections. Made to take 1-16" square or round bus-bar wire. Can be attached with a pair of pliers.

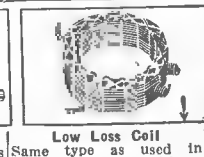
A2975 "T" Wire Connectors, 12 for.....$0.10




**Nosolder Lugs**

Finally, a real solderless lug is here. Soldering positively done away with. Takes square or round bus bar, which it holds with a vise-like grip. Perfect connection. Just slide bus bar into slip-grip.

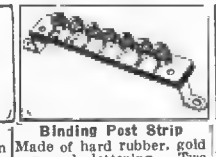
A3727 Lug. 25 for $0.20



**Low Loss Coil**

Same type as used in Freshman and other Tuned Radio Frequency sets. D.C.C. wire. 200-550 wave-length. 3" diameter, 1" wide, 5-16" thick 4 connections, 2 primary, 2 secondary.

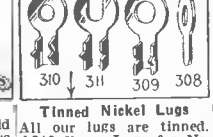
A2629 Low Loss Coil $0.43



**Binding Post Strip**

Made of hard rubber, gold engraved lettering. Two nickel brackets for mounting. 7 hard rubber binding posts. "ANT"; "GND"; "A—", "A+"; "B—"; "DET B+"; "AMP B+".

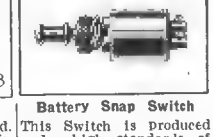
A870 Binding Post $0.35




**Tinned Nickel Lugs**

All our lugs are tinned.

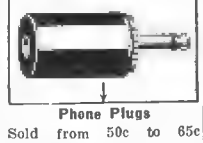
A310 Brass Lugs for No. 8 screw, doz.....$0.10
A311 Copper Lugs for Nos. 6 and 8 screws, doz 0.10
A309 Copper Lugs for Nos. 4, 6 and 8 screws, doz.0.10
A308 Copper Lugs for 6-32 screw, doz. .....0.10



**Battery Snap Switch**

This Switch is produced under high standards of workmanship. Action is positive. Solderless contact screws used. One hole mounting. Nickel-plated all over. Most serviceable switch made.

A7986 .....$0.35



**Phone Plugs**

Sold from 50c to 65c everywhere. Hard rubber composition shell and patented cord tip holder. Finest workmanship throughout.

A1030 Rasco Telephone Plug. Each .....$0.23

**Bakelite Socket**

Octagon shape. Four nickel binding posts, phosphor bronze contact springs. Best brown bakelite.

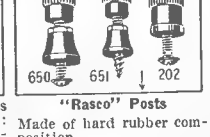
M6510 Bakelite socket $0.40
A6500 Tube Socket Made entirely of composition. Best made. Each..$0.35

**Binding Post Name Plates**

Dia. ¾". These styles: Phones, Ground, —, Output, "A" Bat. —, "B" Bat. —, Loud Speaker, "C" Bat. —, Aerial, +, Input, "A" Bat. +, "B" Bat. +, Loop, "C" Bat. + "B" Bat. —.

New! "A" Bat. —

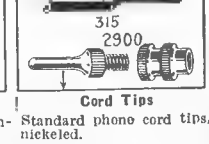
A6000 Name Plates, Dozen ..... .....$0.15




**"Rasco" Posts**

Made of hard rubber composition.

A650-51 Each .....$0.06
A202 Has nickel plated bottom, each .....$0.06
Dozen, each style...$0.70
A122 Initialed Binding Posts. Set of 8. Per Set .....$0 25




**Cord Tips**

Standard phone cord tips, nickeled.

A315 Each .....$0.03

**Separable Cord Tips**

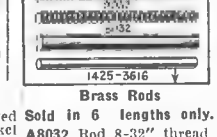
No solder required. Wire goes in ferrule. Shank holds it tight. Nickel plated.

A2930 Each .....$0.06

**"Perfect" Lugs**

These new and improved lugs are brass, nickel plated, flattened on top as shown. Made of a single piece of metal Lead wire goes into tube.

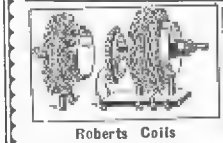
A3110, A3080 "Perfect" Lugs. Each .....$0.02
Dozen lots ..... 0.20




**Brass Rods**

**Sold in 6 lengths only.**

A8032 Rod 8-32" thread length .....$0.08
A6032 Rod. 6-32" thread length .....$0.06
A1425 Rod, plain, ¼" round, length .....$0.10
A3616 Rod, Plain 3-16" round, length .....$0.06



**Roberts Coils**

Diamond weave coils, used in standard Roberts Circuit. Tunes 200 to 570 meters. Used in 2, 3, or 4 tube circuits. These are **genuine** Sickles Coils, not imitations. Set comprises two units, as illustrated.

A-8112, Roberts Coils .....$5.95

**100-Ampere Storage Batteries**

Guaranteed for two years. **Only new material used.** Genuine **hard rubber** case. Acid-proof terminals. Hard rubber vents. Strong carrying handle. Written guarantee goes with each.

A-9100, 6-volt 100-ampere hour battery ...$9.50
Shipped express collect.

## New 1926 "Rasco" Catalog No. 16

CONTAINS 75 VACUUM TUBE HOOK-UPS, 300 ILLUSTRATIONS, 500 ARTICLES

**Also Logbook of all Broadcast Stations**

Just to name a few of the circuits: The V.T. as a detector and one-step amplifier; all Armstrong circuits; one-step radio frequency amplifier and detector; three stage audio frequency amplifier; short wave regenerative circuits; 4-stage radio frequency amplifiers; radio and audio frequency amplifier; inductively coupled amplifier all Reflex Circuits

**FREE**

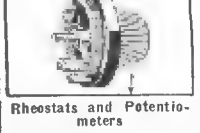
**A POSTAL CARD BRINGS IT**

**NEW**

**Battery Lead Tags**

Latest wrinkle, made in metal, nickel-plated, polished. Clamp tag on battery wire, and it won't come off. These five styles: "B +", "B + Det.", "B —", "A +", and "A —".

A8030 Tags, set of 10 $0.15



**Rheostats and Potentiometers**

High heat bakelite base. Come with tapered, knurled knob, 2½" dia. Complete with pointer.

A4310 6 ohm.....$0.38
A4311 30 ohm ..... 0.44
A4312 Potentiometer 200 ohms ..... 0.50

## RADIO SPECIALTY COMPANY, 100 Park Place, New York City

Factories: Brooklyn, N. Y. Eldridge, Md.

www.americanradiohistory.com

U.S. PATENTS

Don't Lose Your Rights

Before disclosing your invention to anyone send for blank form "Evidence of Conception" to be signed and witnessed. A sample form together with printed instructions will show you just how to work up your evidence and establish your rights before filing application for patent. As registered patent attorneys we represent hundreds of inventors all over the U. S. and Canada in the advancement of inventions. Our schedule of fees will be found reasonable. The form "Evidence of Conception" sample, instructions relating to obtaining of patent and schedule of fees sent upon request. Ask for them,—a post card will do.

LANCASTER & ALLWINE

Registered Patent Attorneys in U.S. and Canada
255 Ouray Bldg., Washington, D. C.
"Originators of form Evidence of Conception"

PATENTS

TO THE MAN WITH AN IDEA

I offer a comprehensive, experienced, efficient service for his prompt, legal protection and the development of his proposition.

Send sketch, or model and description, for advice as to cost, search through prior United States patents, etc. Preliminary advice gladly furnished without charge.

My experience and familiarity with various arts frequently enable me to accurately advise clients as to probable patentability before they go to any expense.

Booklet of valuable information and form for properly disclosing your idea, free on request. Write today.

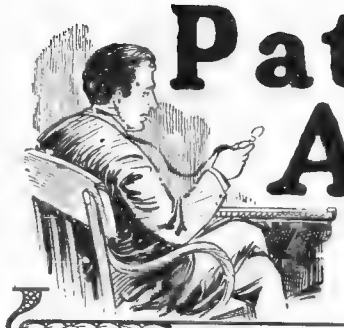
RICHARD B. OWEN, Patent Lawyer
164 Owen Building, Washington, D. C.
41V Park Row. New York City

TRADE-MARKS
REGISTERED

INVENTORS who derive largest profits know and heed certain simple but vital facts before applying for Patents. Our book Patent-Sense gives those facts; sent free. Write

LACEY & LACEY
644 F STREET, WASHINGTON, D. C.
Established 1869

# Patent Advice



Edited By
A. P. PECK

In this Department we publish such matter as is of interest to inventors and particularly to those who are in doubt as to certain patent phases. Regular inquiries addressed to "Patent Advice" cannot be answered by mail free of charge. Such inquiries are published here for the benefit of all readers. If the idea is thought to be of importance, we make it a rule not to divulge all details, in order to protect the inventor as far as it is possible to do so.

Should advice be desired by mail a nominal charge of $1.00 is made for each question. Sketches and descriptions must be clear and explicit. Only one side of sheet should be written on.

NOTE:—Before mailing your letter to this department, see to it that your name and address are upon the letter and envelope as well. Many letters are returned to us because either the name of the inquirer or his address is incorrectly given.

### CONNECTING ROD

(929) Q. 1. Donald Beidler, Lancaster, N. Y., submits complete details on a type of connecting rod bearing which is eccentrically arranged, and which when used in a four cylinder engine, will force the piston to the extreme top of the cylinder on the exhaust stroke; yet on the firing stroke it will leave sufficient room for the firing chamber. This work is accomplished by means of a rather complicated gearing system to be located in the opposite end of each connecting rod to that where the piston is attached.

A. 1. While the theory of your proposed type of piston connecting rod is correct, still we do not believe that the device would be practical under actual operating conditions. It is entirely too complicated and the strain on a connecting rod is far too great to allow the use of a series of gears and an eccentric such as you have designed. Until you have tried your device out in actual practice, we would not advise you to continue with any attempt to patent it. You must realize that a patent cannot be obtained on an idea alone. The subject must invariably be reduced to practice before it can be patented.

### IDEA HAS BEEN PATENTED

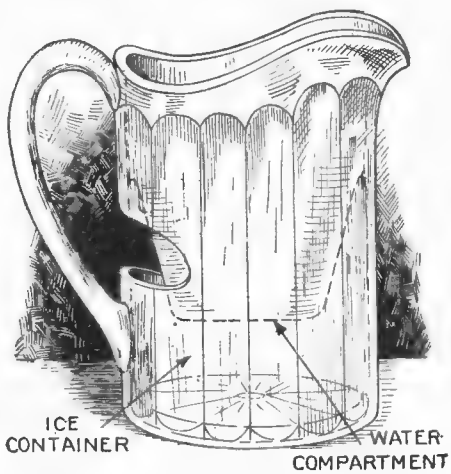
(930) Q. 1. J. E. Whitfield, East Pittsbugh, Penn., has been granted a patent upon a particular type of carpenter's tool and has been attempting to induce some company to manufacture it. He says that all the companies he has written to desire to be paid in advance and so he is suspicious of their intentions. He asks us to advise him.

A. 1. As long as you are protected by a patent, you can just as well go ahead and have your device manufactured, paying the manufacturers in advance without any fear of their stealing your idea. You have come to the hardest part of the inventor's career and you will undoubtedly have some difficulty in placing your device upon the market. Extensive advertising and quantity production will be necessary before you can ever realize on your device and of course such a procedure takes a good deal of money. We do not believe that you need hesitate further about having your device placed under manufacture by any of the companies with whom you have been in communication.

### ICE PITCHER

(931) Q. 1. Miss Margaret Russell, Gary, Indiana, refers to an article published in this magazine some time ago wherein it was suggested that inventors work on the proposition of producing drinking glasses and water pitchers, in which water can be kept cold by means of ice, but in which the ice will not come in contact with the water. She submits a design for a water pitcher of this nature which design is reproduced in these columns and upon which she has obtained a patent. She asks our opinion as to the advisability of marketing this device.

A. 1. Since the publication of the short item that you mention, many designs for drinking glasses and pitchers have been submitted to this magazine. Several of them were quite similar to yours and the one big objection to them all is that they are far too complicated to manufacture and sell at a reasonable price. We have not as yet seen one that, in our opinion, would ever command a very wide sale, and the same holds true for the one that you have designed. We do not believe that it would be profitable for you to proceed with manufacturing this device, although since your patent has been allowed, you might be able to do something with it by communicating with several large glass manufacturers and attempting to sell them the idea either outright or to have them manufacture the item and sell it on a royalty basis.




Above is the design of a water pitcher so constructed as to hold not only water but also cracked ice and at the same time to keep the ice separate from the water. It is not a new idea and we do not believe it will meet with much enthusiasm.

### GASOLINE TURBINE

(932) Q. 1. M. J. Peterson, Berkeley, Calif., has devised a rotary gasoline turbine upon which he desires advice.

A. 1. Several types of gasoline turbines have been patented and are quite efficient in operation. For instance, one has been developed by Dr. Nikola Tesla. Records of similar machines will be found in the Patent Office. Frankly, we do not believe that it would be profitable for you to proceed further with your particular system. This is in view of the fact of the existence of other patents and also because gasoline turbines do not seem to be well received by automotive manufacturers.

### PATENT SEARCH

(933) Q. 1. D. E. Lounsberry, Ardmore, So. Dakota, asks how he can obtain the numbers of all patents that have been issued in the past five years dealing with a certain process.

A. 1. The only way in which you could obtain the information that you mention in your letter of recent date would be to employ some reliable patent attorney to conduct a search for you. This process should cost in the neighborhood of $15.00 and possibly will be even less.

INVENTORS PROTECT YOUR IDEAS

Send for our Guide Book, HOW TO GET A PATENT, and Evidence of Invention Blank, sent Free on request. Tells our terms, methods, etc. Send model or sketch and description of your invention for INSPECTION and INSTRUCTIONS FREE. TERMS REASONABLE. BEST REFERENCES.

Name .....
Street .....
City .....

RANDOLPH & CO.
Dept. 172, WASHINGTON, D. C.

www.americanradiohistory.com

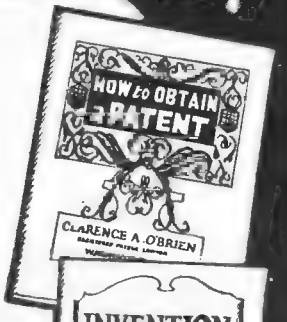
MY PATENT LAW OFFICES

JUST ACROSS STREET FROM U.S. PAT. OFF.

# PATENTS

## INVENTORS Write for these FREE BOOKS!

At the left is a view of my drafting and specification offices where a large staff of experienced experts are in my constant employ. All drawings and specifications are prepared under my personal supervision.



# PROTECT YOUR IDEAS

## Take the First Step Today—ACTION COUNTS

If you have a useful, practical, novel idea for any new article or for an improvement on an old one, you should communicate with a competent Registered Patent Attorney AT ONCE. Every year thousands of applications for patents are filed in the U. S. Patent Office. Frequently two or more applications are made for the same or substantially the same idea (even though the inventors may live in different sections of the country and be entirely unknown to one another). In such a case, the burden of proof rests upon the last application filed. Delays of even a few days in filing the application sometimes mean the loss of a patent. So lose no time. Get in touch with me at once by mailing the coupon below.

### No Charge for Information on How to Proceed

The books shown here contain valuable information relating to patent procedure that every inventor should have. And with them I will also send you my "Record of Invention" form, on which you can sketch your idea and establish its date before a witness. Such evidence may later prove valuable to you. Simply mail the coupon and I will send you the books, and the "Record of Invention" form, together with detailed information on how to proceed and the costs involved. Do this NOW. No need to lose a minute's time. The coupon will bring you complete information entirely without charge or obligation.

### Prompt—Careful Efficient Service

This large, experienced organization devotes its entire time and attention to patent and trademark cases. Our offices are directly across the street from the U. S. Patent Office. We understand the technicalities of patent law. We know the rules and requirements of the Patent Office. We can proceed in the quickest, safest and best ways in preparing an application for a patent covering your idea. Our success has been built on the strength of careful, efficient, satisfactory service to inventors and trademark owners located in every state in the Union.

### Strict Secrecy Preserved Write Me in Confidence

All communications, sketches, drawings, etc., are held in strictest confidence in strong, steel, fireproof files, which are accessible only to authorized members of my staff. Feel free to write me fully and frankly. Your case will have my personal attention. It is probable that I can help you. Highest references. But FIRST—clip the coupon and get my free books. Do THAT right now.

## Clarence A. O'Brien

**Registered Patent Attorney**

Member of Bar of: Supreme Court of the United States; Court of Appeals, District of Columbia; Supreme Court, District of Columbia; United States Court of Claims

**Practice confined exclusively to Patents, Trademarks and Copyrights**

## Mail this Coupon NOW.

CLARENCE A. O'BRIEN,
*Registered Patent Attorney,*
53-F Security Savings & Commercial Bank Bldg.,
Washington, D. C.

Please send me your free books, "How to Obtain a Patent," and "Invention and Industry," together with your "Record of Invention" form without any cost or obligation on my part.

Name.....

Address.....

.....

*(Important: Write or Print name clearly)*

www.americanradiohistory.com

# Play a Saw

C. J. MUSSEHL, Pioneer Musical Saw Artist, has taught thousands to become Experts. Vaudeville stars and high priced entertainers.

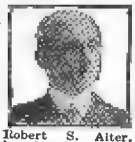
## FREE! 5-Day-Trial to Prove It

JUST to prove how quick and easy you can learn to play a saw, I'll send you a genuine, specially tempered Musical Saw for 5 days' trial. I guarantee that in 24 hours you can play tunes like "Old Black Joe" and "Home Sweet Home". Then you quickly learn latest jazz and song hits, operatic and classical music. Amazingly simple—no notes to read, no dreary practice. You don't need to know a thing about music.

Charles Guglieri, booked to play solos in Broadway (New York) motion picture theatre.

### Play for Money or Fun

The Musical Saw's only rival is the violin for sweetness and expression. Tone effects are positively startling and so unexpected that nothing compares to it in winning instant popularity or becoming a salaried entertainer. Its novelty gains headline position for you. You are always in demand.



Robert S. Aiter, broadcasting celebrity, has delighted audiences of six leading stations, including an appearance from WSN "Steamship LEVIATHAN".

### Success Guaranteed

I have taught thousands to play the Musical Saw. Just three short simple lessons reveal every secret of my 12 years' success as a professional saw musician. Scores of others have won fame and fortune like the three pupils shown here. Let me prove that you, too, can quickly play like a professional.

"Bud" Gamble is paying his way around the world with the Musical Saw. Is now in Europe.

### Phonograph Record FREE!

Double-disc, demonstration-size phonograph record of beautiful Saw solo and duet, sent with full particulars of my free trial offer. You'll wonder that a saw can produce such marvelous music. But the record proves it. Enclose 10 cents (stamps or coin) to cover record handing and postage. Or if you do not want the record, just ask for my big FREE TRIAL OFFER, sent postpaid. It will tell you how you can get Saw, Bow, Soft Hammer and Resin FREE with Course of Instruction after I prove how quickly you can play.

**MUSSEHL & WESTPHAL**
336 West Water St. Fort Atkinson, Wis.


## Model Boiler

(*Continued from page* 1109)

screwed into a socket could easily be mounted in the firebox.

One of the most efficient electrical heaters for this or any type of steam driven model is that employing two metal sheets immersed in the water and separated about one inch from each other. Not only is steam generated in great quantities by such a form of heater, but the decomposition of water ordinarily taking place when two plates are immersed into it and connected with a source of current supply, aids in making the device run faster. In this particular type of heater, it is desirable to insert a resistance at the point marked off, which resistance may take the form of a flat iron, a heating coil or several incandescent lamps. This resistance placed in the circuit will prevent a short circuit and also prevent burning out of fuses. The alcohol gas burner illustrated in the diagram which has been used with great success with this model is simply built up as indicated. The two small pilot burners are then lit and the heat produced by them causes gas to be rapidly evolved, which coming through the small openings in the covers for the wicks, or burners as they may be called, produces a flame possessing a yellowish color but developing a great amount of heat. Note that the overflow pipe leading to the alcohol reservoir serves a double purpose, namely, that of permitting expanded alcohol to flow out through it and also preventing an accumulation of air inside, and thus possibly spraying the interior of the fire box with alcohol. This particular burner may be put out by simply blowing into the fire box. There is never any danger with its use. The manometer contains a flattened copper tube bent in the form of a semi-circle. When steam pressure is applied the tube tends to straighten in direct ratio to the pressure applied.

For blueprints of previous pages, 1109 and 1110, a nominal charge of $1.00 is made. The complete set of blueprints, four in all, may be had at $2.00, and those desiring the same should address their communications to the Editor of the Model Department, Blueprint Division.


# $5,000 for Perpetual Motion

When SCIENCE AND INVENTION Magazine was still in its infancy, the editors denied the possibility of constructing a perpetual motion machine using those forces of nature as we now know them.

Since that time the editors have received thousands of different designs for perpetual motion devices, and have received hundreds of circular letters soliciting finances for the building of perpetual motion machines.

The editors know that if they receive these letters, there are thousands of others in this country who get similar letters and who fall for the claims made in the numerous prospectuses giving the earning capacities of the various machines.

Most of the shares of stock for these perpetual motion machines are being sold at a rate of $1.00 per share, although some inventors are trying to sell shares of stock at $100.00 per share.

Therefore the editors of this publication say, "Just come in and show us—merely SHOW us—a working model of a perpetual motion machine and we will give you $5,000.00. But the machine must not be made to operate by tides, winds, waterpower, natural evaporation or humidity. It must be perpetual motion."

# PATENTS

TRADE MARKS · DESIGNS
FOREIGN PATENTS

**MUNN & CO.**
PATENT ATTORNEYS

*Associated since 1846 with the Scientific American*

618 Woolworth Building, *New York City*
525 Scientific American Bldg., *Washington, D.C.*
1314 Tower Building, *Chicago, Ill.*
667 Hobart Building, *San Francisco, Cal.*
522 Van Nuys Building, *Los Angeles, Cal.*

*Books and Information on Patents and Trade Marks by Request.*

# PATENTS

I make a specialty of patents and trade marks. Protect and profit by your ideas. Advice and terms on request. Fourteen years' active practice before U. S. Patent Office. Write today.

**LESTER L. SARGENT, Patent Lawyer**
524 Tenth St., N. W., Washington, D. C.

# PATENTS

BOOKLET FREE — HIGHEST REFERENCES
PROMPTNESS ASSURED — BEST RESULTS
Send drawing or model for examination and report as to patentability

**WATSON E. COLEMAN, Patent Lawyer**
644 G Street, N. W., Washington, D. C.

**PATENTS**
PROMPTLY PROCURED. SEND A SKETCH OF YOUR INVENTION.
**FREE** INVENTION RECORDING BLANK

NAME_____
ADDRESS_____
MAIL TODAY

# INVENTIONS Commercialized

TURN INVENTIONS INTO CASH

ON A CASH OR ROYALTY BASIS
PATENTED or UNPATENTED
*In Business 25 Years · Complete Facilities · References.*
*Write* ADAM FISHER MFG. CO.
205D Enright Ave. St. Louis, Mo.

**C. L. PARKER**
Ex-Member Examining Corps, U. S. Patent Office
Attorney-at-Law and Solicitor of Patents

American and Foreign Patents secured. Searches made to determine patentability, validity and infringement.
Pamphlet of Instructions sent upon request
McGILL BUILDING WASHINGTON, D. C.

**BLUE BOOK ON PATENTS**
and Priority Record blank gratis.
MONROE E. MILLER, PATENT LAWYER,
411-6 Ouray Building, WASHINGTON, D. C.
ELECTRICAL AND MECHANICAL EXPERT

# LAW

**Personal Instruction By Mail** Be a lawyer or law trained business man. Qualify to earn $2,500.00 to $15,000.00 a year. University methods. TUITION LOW. EASY TERMS. Text books furnished. Practical and authoritative non-resident course. Endorsed by bench and bar. Prepares for bar or business. Over 60,000 students. PERSONAL INSTRUCTION. Guarantee to coach free any graduate failing to pass bar exams. SPECIAL REDUCED TUITION OFFER now in force. Write today for particulars and book on law FREE.
AMERICAN CORRESPONDENCE SCHOOL OF LAW
Dept. 1424 3601 Michigan Avenue, CHICAGO

# LAW

**STUDY AT HOME**
Become a lawyer. Legally trained men win high positions and big success in business and public life. Be independent. Greater opportunities now than ever before. Big corporations are headed by men with legal training. Earn
**$5,000 to $10,000 Annually**
We guide you step by step. You can train at home during spare time. Degree of LL.B. conferred. LaSalle students found among practicing attorneys of every state. We furnish all text material, including fourteen-volume Law Library. Low cost, easy terms. Get our valuable 108-page "Law Guide," and "Evidence" books free. Send for them NOW.
**LaSalle Extension University, Dept. 4384-L Chicago**
*The World's Largest Business Training Institution*


www.americanradiohistory.com

## Tarrano the Conqueror

(*Continued from page* 1138)

signals shrilled in crazy fashion. Public mirrors were dark, or turned to places and time wholly irrelevant.

In the palace itself we soon secured a semblance of order. Maida's girls were here, with wet veils and long dank tresses clinging to their sleek bodies. Lips painted alluring red. But eyes which now were solemn and grim. Their demeanor alert and business-like. Unconscious of themselves they moved about the palace, executing Maida's orders.

A dozen or so of Maida's personal retainers were here—and most of the Earthmen. Keen-eyed young men of the Washington Headquarters Staff. One of them—Tomm Aften by name, a ruddy, blue-eyed fellow—was in command. He stayed close by Georg and me.

The city was seething. But out of the chaos was coming a comparatively orderly menace. We could sense it at first; and then in a few brief minutes so swift that we had no time to prepare—the menace became obvious and was at hand.

The slaans had withdrawn from the festival for a greater, more organized effort. Their revolt against Tarrano in which Maida had joined, was bigger, more deep-rooted than a mere revolt. It was against Maida herself. Trickery of the down-trodden slaans against the ruling class. Against the old order of government. Even against the Rhaals, who in their distant city were all-powerful, but who obeyed the laws and took no part in anything.

Revolution! From down the waterways of streets which converged into the broad lagoon before the palace, boats began arriving. Boats crowded with slaans. Disheveled, unkempt men and women with primitive weapons of steel and wire brandished aloft. They surged into the lagoon. A murderous, frenzied mob—thoughtless of itself, suicidal to attack us, yet daring everything in its frenzy.

Soon the lagoon was crowded—a chaos of pushing, shoving boats. Then the boats began landing, disgorging their occupants, wild-eyed slaans each a potential murderer. The gardens of the palace were presently jammed with them. They did not at first come within our threshholds; they stood milling about under the palms, trampling the tropic flowers, screaming threats and epithets at us. But waiting—as a mob always does—for some leader to advance, that they might follow him upon us.

We stood on the palace roof-top. I must confess that we were in a flurry for the moment. There were undoubtedly weapons at hand, but I at least did not have them, nor did I know where they were. Excusable flurry possibly for the thing had come so quickly, and most of us were strangers here of but a few hours.

The roof had a low railing waist-high, but broad. We stood clustered behind it. In the garden beneath, the mob was shouting up at us. And, before I could stop her, Maida had leaped to the top of the rail. Georg and I clutched at her, then steadied her.

"Slaans—"

But they would not hear her. Shouts went up; a roar of threats. The press of additions to the mob landing from other boats, forced the front ranks forward. They were now on the palace steps, jammed there waving their weapons yet still hesitating to advance.

"Slaans—my people—"

(*Continued on page* 1146)

PATENTS TRADE-MARKS AND COPYRIGHTS

OUR OFFER: FOR THE PROTECTION OF YOUR INVENTION

*YOUR FIRST STEP* before disclosing an invention. The inventor should write for our blank form—

**"Record of Invention"**

This should be signed and witnessed and returned to us together with model or sketch and description of the invention for INSPECTION and INSTRUCTIONS.

NO CHARGE FOR THE ABOVE INFORMATION

**Our Four Books Mailed Free to Inventors**

*Our Illustrated Guide Book*

**HOW TO OBTAIN A PATENT**

Contains full instructions regarding U. S. Patents. Our Methods, Terms, and 100 Mechanical Movements illustrated and described.

**OUR TRADE MARK BOOK**

Shows value and necessity of Trade Mark Protection. Information regarding *Trade Marks and unfair competition in trade.*

**OUR FOREIGN BOOK**

We have Direct Agencies in Foreign Countries, and secure Foreign Patents in shortest time and at lowest cost.

**Progress of Invention**

Description of World's Most Pressing Problems by Leading Scientists and Inventors.

**IMPORTANT**

Do not submit your invention to anyone before you furnish proof that the invention is patentable or application has been filed. IN ORDER TO HAVE YOUR CASE MADE SPECIAL TO AVOID DELAY YOU SHOULD TAKE THE PRECAUTION OF HAVING YOUR CASE MADE SPECIAL IN OUR OFFICE to secure protection, save correspondence and secure early filing date in Patent Office. To secure special preparation of your case send $25.00 on account with model, sketch and description of your invention.

All communications and Data Strictly Confidential. Interference and Infringement Suits Prosecuted. Our Organization offers PERSONAL SERVICE by Experienced Patent Solicitors and Draftsmen.

*We Regard a Satisfied Client* as our best advertisement, and furnish anyone, upon request, lists of clients in any state for whom we have secured patents.

*Highest References—Prompt Attention—Reasonable Terms*

*WRITE TODAY*

FREE COUPON

VICTOR J. EVANS & CO., *Patent Attorneys*

New York Offices 1007 Woolworth Bldg. Philadelphia Offices 714-715 Liberty Bldg. Pittsburgh Offices 514 Empire Bldg.
Chicago Offices, 1114 Tacoma Bldg. San Francisco Offices, Hobart Bldg.
Main Offices, 779 Ninth Street, Washington, D. C.

Gentlemen: Please send me FREE OF CHARGE your books as described above.
Name..... Address.....

www.americanradiohistory.com

# Master Electricity By Actual Practice

The only way you can become an expert is by doing the very work under competent instructors, which you will be called upon to do later on. In other words, *learn by doing*. That is the method of the New York Electrical School.

Five minutes of actual practice properly directed is worth more to a man than years and years of book study. Indeed, Actual Practice is the only training of value, and graduates of New York Electrical School have proved themselves to be the only men that are fully qualified to satisfy EVERY demand of the Electrical Profession.

## The Only Institution of the Kind in America

At this "Learn by Doing" School a man acquires the art of Electrical Drafting; the best business methods and experience in Electrical Contracting, together with the skill to install, operate and maintain all systems for producing, transmitting and using electricity. A school for Old and Young. Individual instruction.

## *Over* 10,000 *Graduates are Successful Men in the Electrical World*

No previous knowledge of electricity, mechanics or mathematics is necessary to take this electrical course. You can begin the course now and by steady application prepare yourself in a short time. You will be taught by practical electrical experts with actual apparatus, under actual conditions.

The N. Y. E. S. gives a special Automobile Ignition Course as an advanced training for Auto Mechanics, Garage Men and Car Owners. The course covers completely all Systems of Ignition, Starters, Lighting and other electrical equipment on automobiles, motor boats, airplanes, etc.

*Let us explain our complete course to you in person. If you can't call, send now for 64-page book—it's FREE to you.*

**New York Electrical School**
**29 West 17th Street, New York**

**New York Electrical School**
**29 W. 17th St.,**
**New York, N. Y.**

Please send FREE and without obligation to me your 64-page book.

..... Name

..... Street

..... City



# LEARN RADIO

Become a big-pay man in the greatest industry of all time. Quickly, easily and right at home, you can fit yourself for highest salary positions, or you can cash in on your spare time. The call is urgent for mechanics, operators, designers, inspectors. Unlimited, fascinating opportunities on land or sea.

**I WILL TRAIN YOU AT HOME TO BE A RADIO EXPERT**

Under my practical, easy to understand, instruction—you qualify in an amazingly short time. No previous experience is necessary. Every branch of radio becomes an open book to you. You learn how to design, construct, operate, repair, maintain and sell all forms of Radio apparatus. My methods are the latest and most modern in existence.

**FREE** Wonderful home construction tube receiving set of the latest design. **Write Today** "Radio Facts" **FREE**

A. G. Mohaupt, Radio Engineer, RADIO ASSOCIATION OF AMERICA, Dept. 64, 4513 Ravinswood Ave., Chicago.

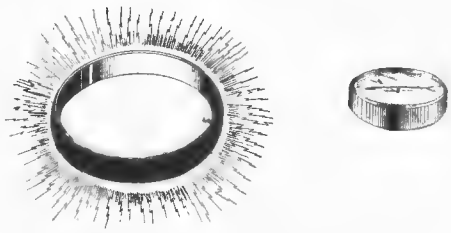

Insure your copy reaching you each month. Subscribe to Science and Invention—$2.50 a year. Experimenter Publishing Co., 53 Park Place, N. Y. C.

## Medical Frauds

By JOSEPH H. KRAUS

(*Continued from page* 1084)

executed on the gallows, and was a specific for anything from ingrowing toenails to falling hair. A serious article on "Usnea" and "Mummy" may be found in the first edition of the Encyclopedia Britannica, and,



So-called magnetic or electric rings have absolutely no value in a medical sense.

incidentally, in Dr. James J. Walsh's book, called "Cures."

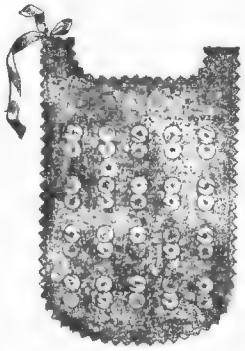
### FETISHES AS CURES

A little later a hangman's noose or portions of the rope with which a person was hung, were supposed to "turn the blood current," when a person was touched with the piece of rope, and thus were expected to *cure* paralysis, disabled limbs or wasted fingers.

Coming down through the ages a few more years, we find *rattlesnake oil* used extensively in the West. As a matter of fact, there are many medicine men traveling through the Middle and Western States, and occasionally making their appearance along the East Coast, who are still selling rattlesnake oil. This oil is supposed to have been made from rattlesnakes. It is, however, no more efficacious than ordinary butter. On analysis, the oil is no different from other oils extracted from animal fat tissue.

### ABANDONED MEDICINES

Then along came sarsaparilla. Millions of people swore by it. Hundreds of thousands of bottles were purchased every year, but no one takes any sarsaparilla now except as a seasoning for soda water. The product



At the left is shown a typical "electrical" chest protector in which series of copper and zinc disks are placed. The curative powers of a contraption of this nature are absolutely nil. Money invested in a device such as that shown is wasted.

is sometimes used to mask the taste of unpleasant medicine, but otherwise it does no good.

We next hear of the long line of *bitters* and *whiskey tonics*. These were wonderful medicines, and cured everything from idiocy to rheumatism. Cheap whiskey and colored water, to which some bitter drugs were added, were remedies for every known ailment or disease, but they, too, passed away.

### OTHER FADS USED TO TREAT DISEASES

At about the time that the bitters were so popular, there was a "blue glass-cure" craze. People would sit for hours behind a blue glass window taking blue-glass baths, and it was not very long ago that I listened to a lecture given at a well-known New

www.americanradiohistory.com

York hotel, where the "doctor" advised that every light color has its distinct effect upon the human organism, and that a person born under violet light was bound to be healthy, while those born under the influence of yellow light, or in a room lighted by yellow lamps, had practically no chance of surviving. The "doctor," himself a healthy specimen, claimed that he was not born under the influence of violet light.

Combs are often sold that contain small bar magnets in the back as shown in our illustration at the right. These magnets are supposed to have a stimulating effect on the hair when the combs are employed. This is untrue as has been frequently proven. Therefore, do not waste your time and money on a comb of this type.

### QUACK REMEDIES

Many of our readers can remember when *electric belts* and *magnets* were used as the treatment for any kind of an ailment. These *batteries*, which were strapped around the waist, became polarized almost the instant they were applied and, consequently, gave no current. Nevertheless, according to their wearers, they produced remarkable effects, and testimonial upon testimonial piled in to the concerns handling the articles. Among the electric cure-alls were the electric shoe-soles, electric combs, magnetic combs to stop the hair from falling out, electric rings and magnetic rings, generally made of steel, which "drew the poison out of the body," as the finger showed when the ring was removed, because a brown stain was left behind. This stain was merely a stain of rust. Rings of zinc were also worn.

How many of our readers remember the flaming red *chest protectors* that could be obtained at any local pharmacy, and may be found in some of them even to this day? Many of us recall the *vacuum cup* craze, or the kidney-shaped plasters, which were to relieve pains in the back and cure all sorts of diseases. Many will recall the absurd "liver pads" of a generation ago.

Now, the fact of the matter is, that, with the exception of acute nephritis or a stone in the kidneys, the kidneys themselves give no pain whatsoever. The worst cases of Bright's disease, representing more than seven-eighths of all the kidney diseases, so called, run their course without any discomfort. These lumbar pains are located primarily in the muscles of the back.

Our advice to readers is to know what they are purchasing before they buy it, and not to depend on the glaring advertisements in the shop windows, which are meant to deceive. The statements on the box are all that count. No concern has been prosecuted for window advertising, and window placards may make any irresponsible or misleading statements, but the Government keeps a rigid control over the statements printed on the labels of all drugs.

In this magazine we will only discuss the reputable, *bona fide* systems of treatment. Cancer cures are not recorded, because, up to the present time, such a thing as a *cancer cure* has not been discovered. Treatments for cancer are numerous, but they are not found in dollar packages to be purchased at the local drug store and used indiscriminately.


# The One Thing You Need for the Big-Pay Job

You're bound to get it some day

Get going and get it Now

YOU OWE IT TO YOURSELF TO SUCCEED and this coupon starts you to success

## The Man Who Knows Gets the Big Money—Every Time

Big pay comes swiftly and surely to the man who knows practical electrical work complete. The electrical field offers wonderful opportunities to men with training enough to work themselves into the big pay jobs that are open.

The chances are that training is the one thing you need to jump ahead to real big money. A few hours a week spent now in getting your training will help you immediately on the job, will prepare you for quick and steady promotion, and without a doubt will start you to making your entire life happier and more comfortable.

Isn't this training worth getting? Isn't it just what you want? Start on it right away!

## AMERICAN ELECTRICIANS' LIBRARY

The six volumes of AMERICAN ELECTRICIANS' LIBRARY bring you step-by-step directions for the installation of every type of conduit wiring job; they tell you just how to handle every kind of lighting circuit and switch job; they give you stunts for saving time on maintenance routine; they give you usable tips on electrical machinery erection; they offer you practical, clear explanation of all kinds of A.C. armature winding jobs; they bring you a thousand armature winding and electrical machinery and control diagrams; they show you the surest, quickest methods of locating and remedying circuit troubles. They cover a thousand and one problems that you have to face daily.

### The only library of its kind—just out!

The thousand wiring diagrams in these six books are alone worth the price of the entire library to any man who wants to succeed in the electrical field. Many of these diagrams are unobtainable elsewhere; many more are very hard to get from any other source; all of them are much clearer and more helpful than most wiring diagrams available. These wiring diagrams alone make Croft's AMERICAN ELECTRICIANS' LIBRARY a great set of books.

### Free examination—small monthly payments

In this new Library you are offered $17.50 worth of new books at a special price for the set of $16.00, payable $2.00 in ten days and $2.00 monthly for only seven months. You need not take our word for the value of the books. You may examine them yourself in your own home for ten days free. No obligation to purchase—no annoying follow-up—no red tape. We even pay return charges, should you decide to return the set. Take advantage of this liberal plan to examine these books for yourself and see how much they can help you. Don't stand in your own way.

**SEND NO MONEY MAIL THE COUPON**

McGraw-Hill Book Co., Inc., 370 Seventh Ave., New York.

Gentlemen — Please send me the Croft American Electricians' Library (shipping charges prepaid), for 10 days' free examination. If satisfactory, I will send $2.00 in ten days and $2.00 per month until $16.00 has been paid. If not wanted, I will write you for return shipping instructions. (Write plainly and fill in all lines.)

Name.....

Address.....

Position.....

Company.....

S.I. 4-1-26


www.americanradiohistory.com

2 Generations of Honorable Dealings
WASHINGTON JEWELRY CO.
BOSTON, MASS.

# It's SHOCK-PROOF!

Wear it for 10 days at our expense!

## Waltham "SPORTSMAN" Strap Watch

REMARKABLE Waltham achievement—designed for hunting, camping, golfing, fishing, strenuous outdoor sports. Has the wonderful "SHOCK-PROOF" movement, double-strength mainspring; steel wheels, plates, escapement. Impervious to weather and shocks. Sizzling sun, freezing weather, jars, exposure do not affect its time-keeping. Built into special DUST-PROOF, MOISTURE-PROOF case.

**Professional Men, Business Men, Sportsmen, Globe-Trotters are AMAZED at its Performance!**

WE have sold hundreds to professional men, business men, sportsmen, globe-trotters—they are amazed at its marvelous performance under most gruelling conditions. CASE is gold-filled, double stock; handsome cushion shape that wins admiring glances. Radium numerals and hands tell the time vividly in pitch darkness. Strap is genuine pigskin. Regular price $30.00. Our price (while the limited quantity lasts) $23.75

## Send NO Money! NOTHING to Pay Postman!

*The coupon brings it to you for 10 days' trial absolutely FREE! Test it under most strenuous conditions. If pleased you may pay at the rate of* $5 MONTHLY *or if you wish to pay cash within 10 days, deduct $1.75 and send Check or Money Order for.....* $22

## Strap Watch is Here to Stay!

THE demand for Strap Watches is increasing daily. Men in every walk of life are wearing them because they are so handy. *"A twist of the wrist—there's the time."* It does away with fumbling in pockets and unbuttoning of coats. Waltham Watch Co., realizing the Nation-wide Vogue, designed the *Shock-Proof* "SPORTSMAN" — smart enough for dressiest functions — sturdy enough for most strenuous sports. The coupon brings one to YOU for 10 Days' FREE Trial.

**WASHINGTON JEWELRY CO.**
*Importers and National Mail Order House*
365 Washington Street, Boston, Mass.
*Largest Distributors of Waltham "Sportsman" Watches in the World*

Gentlemen:—Send me the $23.75 Waltham Shock-Proof "Sportsman" for 10 Days' FREE Trial. If pleased, within 10 days I have the privilege of paying $5.00 monthly or of deducting $1.75 and sending $22.00 in full settlement. Otherwise, I shall return it.

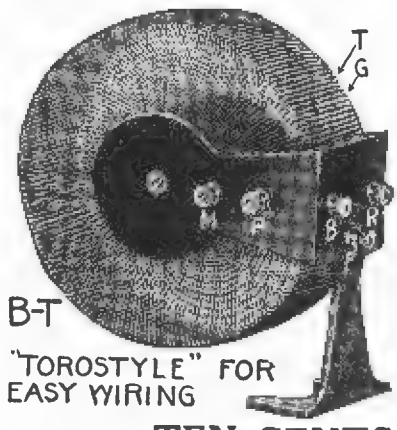
NAME .....

ADDRESS .....

*Tear out and mail this coupon NOW! If you wish to tell us something about yourself, it will be appreciated—simply write on separate slip of paper.* S. I. 4-26

Send NO Money!
NOTHING to Pay Postman!
Simply send the Coupon NOW!

# A REAL CIRCUIT PLUS GOOD PARTS




THE COMBINATION YOU HAVE BEEN LOOKING FOR -- NOW AVAILABLE IN THE BREMER-TULLY

## COUNTERPHASE

**4, 5 or 6 Tube**

Now you can build that receiver, secure in the knowledge that it will not be obsolete next year or the year after.

The Torostyle R. F. Transformer (patented) were designed for the Counterphase and they may be purchased singly or in kits.

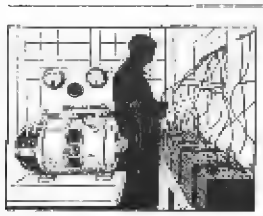
No. 5 Kit contains the essential parts for the 5 tube (2 stages R. F.) set.....Price $28.50

No. 6 Kit contains the essential parts for the 6 tube (3 stages R. F.) set.....Price $38.00

**TEN CENTS** brings to you the 9th edition of Better Tuning just off the press. A fund of information for all those interested in radio—Counterphase fully discussed, wiring diagrams on the 4, 5 and 6 tube sets—acquaints you with all the B-T parts and circuits which have created an enviable name for B-T. **The biggest dime in radio!** **Circulars sent free!**

## BREMER-TULLY MFG. CO.

532 SO. CANAL ST.
CHICAGO, ILL.



$150 to $300 monthly profits EASILY made with ONE DAY Battery Charging

Thousands of HB users are making big profits every month. Every car owner and radio owner wants quick, reliable One Day Charging. Get their business with an HB One Day Battery Charger. Small cash payment brings you complete outfit on 30 days' trial with money back guarantee. Only $16.50 monthly pays for your HB, easily made many times over by your increased battery charging business. Get an HB now. Start making $150 to $300 clear monthly profits. Write for free bulletin 326.

HOBART BROS. CO., Box S4 TROY, OHIO

MORE HB than ANY OTHER MAKE BATTERY CHARGERS are in use than of ANY OTHER MAKE

## Tarrano the Conqueror

(*Continued from page* 1143)

Maida's frail voice was lost in the uproar. Then a missle was thrown upward—a portion of a broken generator—a heavy chunk of metal. It barely missed Maida, and fell with a thump to the roof behind us. Then came others—a rain of them about us. I tried to pull Maida back, but she fought me, her voice still calling out its appeal.

With a bound, Georg was up on the rail beside her. Aften—the young Earthman—had quietly handed him a cylinder. Georg waved it at the mob with one hand, and his other arm was about Maida's waist.

"Slaans—" His stronger voice caught their attention. A sudden hush fell.

"Slaans—it is I, Georg Brende. Your Princess Maida rules you now only under me. A new ruler, Slaans—the man of Earth—Georg Brende who must be obeyed—Georg Brende, soon to be husband of your Princess—"

But they would not hear him out. The din from them submerged his voice. His lips snapped tight as abruptly he ceased talking; his brows lowered grimly and I saw his finger press upon the cylinder.

Maida's voice screamed: "Georg! Have mercy! Do not kill them!"

She spoke barely in time. His cylinder swept upward. The rays from it caught only the upper portions of the palms and the tree tops. The foliage withered, shriveled before that soundless, invisible blast.

Not a blast of heat. The mob, surprised, then frightened, stared upward. The soft tropical foliage in a great wide swath was dead, with naked sticks of limbs. Black, then turning white. Not with heat—but cold. Ice was forming from the moisture in the humid air. And then the sudden condensation brought snow—a thick white fall of it sifting down into the palm-laden garden; falling gently, then swirling in a sudden wind which had begun.

As though itself stiffened by the cold just overhead, the mob stood transfixed. Then a murmur of horror came. And I saw through the veil of whirling snow, that into some of the trees slaans had climbed. Their bodies, frozen now, slid and fell—black plummets hurtling downward through the swirling snow-flakes.

(*To be continued*)

## The Radio Constructor

By A. P. PECK

(*Continued from page* 1128)

to prevent distortion. Where a 4½-volt "C" battery is usually accepted as standard, a 7- to 9-volt battery may be necessary when the eliminator is used.

When considering the construction of a "B" battery eliminator, do not be misled by attempting to incorporate inferior or makeshift parts in it. It pays to buy the best in the beginning even though they cost a litle more. Since the tube life as mentioned above is a good many years, you can safely count upon using a well made "B" eliminator for as long a period of time as you desire to think of. Even at that the instrument will probably exceed your expectations both in operation and in length of life. We are quite sure if you build an eliminator of the type shown in this article that you will be more than pleased with the results obtained.

In case you are not sure just where to buy the various parts for this unit, a stamped addressed envelope addressed to the attention of the writer will bring a list of the manufacturers to you.

www.americanradiohistory.com

## The New Cosmic Ray

By PROF. D. H. MENZEL, Ph.D.

(*Continued from page* 1092)

PROBABLE SOURCE OF COSMIC RAYS

Where do these rays come from? It is clear that they do not come from the sun, for no change in their intensity was observed throughout the day or night. In view of the enormous quantities of energy necessary to produce X-rays, it is obvious that still greater sources of energy are needed for the cosmic rays. Professor Millikan suggests that it is *probable that these rays originate from the decomposition of atoms in the far off stars and nebulae*—transformations similar to those whereby radium gives off the gamma rays, but about fifty times as powerful. When we recall the disastrous effects of X-rays and their serious burns we are thankful that the cosmic rays do not exist in sufficient enough quantity to cause any harm.

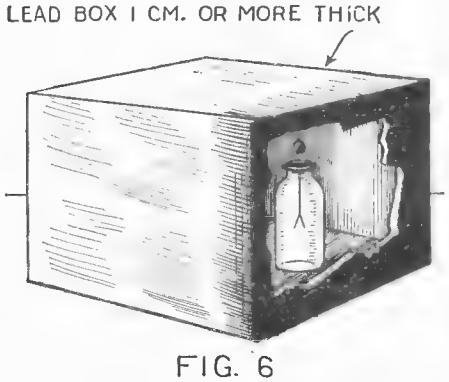



FIG. 6

An electroscope enclosed within a lead box was affected by the cosmic ray almost as readily as if there had been no enclosure.

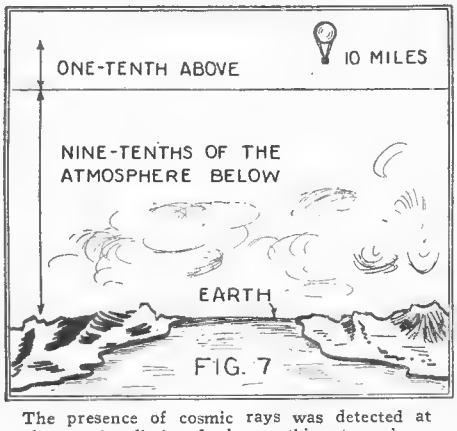



FIG. 7

The presence of cosmic rays was detected at almost the limit of the earth's atmosphere, proving that the rays were coming from space.

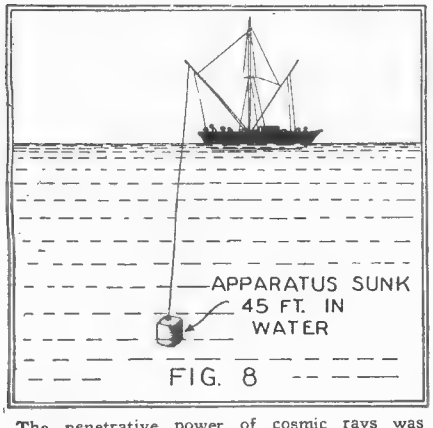
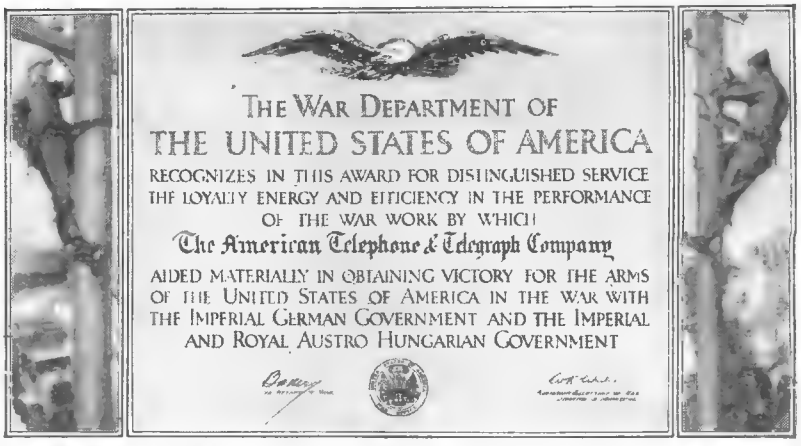



FIG. 8

The penetrative power of cosmic rays was noted and proven in an experimental way by lowering the detecting apparatus into 45 feet of water which had no radio-active powers. At a depth of 45 feet, the effect stopped.



THE WAR DEPARTMENT OF
THE UNITED STATES OF AMERICA
RECOGNIZES IN THIS AWARD FOR DISTINGUISHED SERVICE
THE LOYALTY ENERGY AND EFFICIENCY IN THE PERFORMANCE
OF THE WAR WORK BY WHICH
The American Telephone & Telegraph Company
AIDED MATERIALLY IN OBTAINING VICTORY FOR THE ARMS
OF THE UNITED STATES OF AMERICA IN THE WAR WITH
THE IMPERIAL GERMAN GOVERNMENT AND THE IMPERIAL
AND ROYAL AUSTRO HUNGARIAN GOVERNMENT

# *Telephone Preparedness*

NINE years ago, when this nation was preparing for war, it found the Bell Telephone System ready for service at home and abroad. The war found the Bell System prepared. From its technical forces so needful to meet our war-time activities in this country, fourteen battalions were organized to carry to the front the highest developments of the telephone art. No other nation had so complete a system of communication to aid in mobilizing its resources. No other nation was able to put into the field a military communication, system of equal effectiveness.

Fifty years ago Alexander Graham Bell, the inventor of the telephone, gave to the world a new art. He had the vision of a nation-wide telephone system by which people near at hand and far apart could talk to one another as if face to face. He foresaw a usefulness for the telephone which could not be achieved without innumerable developments, inventions and improvements, to him unknown. But not even he foresaw the marvelous applications of telephony which gave to the American armies that fighting efficiency which is possible only when there is instant exchange of complete information.

Since the completion of its service in time of war, the Bell System has devoted itself to the extension of the telephone art as one of the great agencies for the development of the pursuits of peace.

AMERICAN TELEPHONE AND TELEGRAPH COMPANY
AND ASSOCIATED COMPANIES

*BELL SYSTEM*

IN ITS SEMI-CENTENNIAL YEAR THE BELL SYSTEM LOOKS FORWARD TO CONTINUED PROGRESS IN TELEPHONE COMMUNICATION

60 DAYS TRIAL, MONEY BACK If Not Pleased $10 Daily Easily Made.

**New Unbreakable Fountain Pen**

Agents Sample Only **67c** Regular Retail Price $1.25

Beautiful Red, Green Black or Purple — Ladies or Gents Style

*Guaranteed for Two Years*

*Latest Improved Point*

WRITES LIKE A $7 PEN

**FREE**

New and unusual Mail Order Distributing Plans and Large Wholesale Specialty Catalog showing best sellers from all parts of the world. Money refunded if not pleased.

MARK CHECK AND FILL OUT AT ONCE

F. SPORS & CO., 231 Agate St., Lesueur Center, Minn.

( ) Send sample c.o.d. 67c, plus postage charges.
( ) Send 12 trio pens, assorted colors, c.o.d., $6.42 plus postage.
( ) Send catalog, no obligations on my part.

Name .....

Address .....

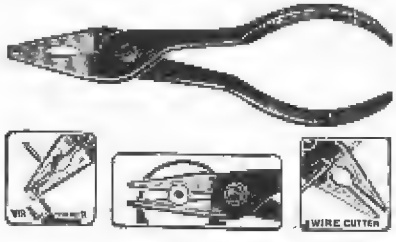

www.americanradiohistory.com

# SAVE TIME AND MONEY

We have radio Tools of every description for every conceivable set building purpose

*You will be astonished at the remarkable tools we have for your work and delighted at our low prices*

NO. 202



### COMBINATION PLIER

Combination Plier, Wire Cutter, Wire Former and Wrench. Drop forged, slender but exceptionally strong. 6 inches long.
No. 202—Combination Plier, Wire Cutter, Wire Former and Wrench.....75c

### RADIO TOOL SET

This is the handiest set of tools ever made for Radio Work by the makers of the famous "YANKEE" Tools. It contains the following: 1 Ratchet Screw-driver, 6½ in. long holding all attachments; 1 Blade, 5½ x 3-16; 1 Blade, 3½ x ⅛; 1 Blade 2½ x ¼; 1 Countersink; 2 Socket Wrenches for all small nuts; 1 Reamer to enlarge holes in panel from ⅛ to ½; 1 Wrench, one end 5-16" square or hex. for jack, other ½" hex., etc.
PRICE per set—No. 701.....$3.00

NO. 701

### SIDE CUTTING NIPPER, LAP JOINT

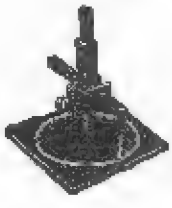
For cutting all kinds of wire. Jaws hardened and oil tempered. Natural steel finish with polished jaws. Length 6 inches.
PRICE—No. 201 .....75c

NO. 201

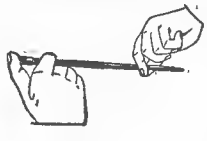
### CIRCLE CUTTER

Especially designed for the Radio Constructor. Made of the finest material and equipped with the highest grade high steel cutting bits. It does three things at once. It drills its own pilot, cuts out plug and puts bead or scroll around the hole in one operation. Cuts holes ¾ to 4 in. in diam.
PRICE—No. 402 .....$3.00
401. Same tool but smaller and not fitted with bead or scroll in one operation.
PRICE—No. 401 .....$2.00

Nos. 401 & 402



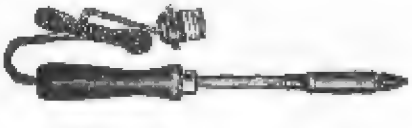
NO. 304



### SCREW STARTER and DRIVER

Holds any screw by its slot with a firm grip, makes it easy to place and start screws in difficult places. Just the tool for the Radio Constructor. All parts heavily nickeled and polished.
PRICE—No. 304 .....$1.00

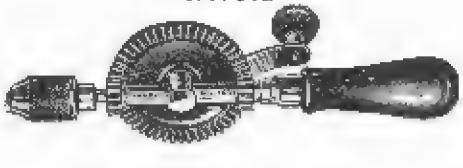
NO. 800



### ELECTRIC SOLDERING IRON

A perfect tool for Radio Work. Operates either on 110-volt A.C. or D.C. The heat element is of Nichrome, which prevents overheating and assures the desired even temperature. Size of Iron, 10½ in. long. A 4-ft. cord and plug is furnished.
PRICE No. 800 .....$2.00

NO. 302



### HAND DRILL

Especially designed for Radio Work by the makers of the famous "Yankee" Tools. A beautiful balanced, small, powerful drill with 4 to 1 ratio of gears for speed. Special chuck 9-32" capacity, to take largest drill, mostly furnished with drill or tool sets. Length over all, 9½ in. Weight 1½ lbs.
PRICE—No. 302 .....$2.75

Order all tools by order number. All goods are shipped free of transportation charges to all parts of the United States and possessions the same day as the order is received.

**MONEY REFUND GUARANTEE**

*If you are not satisfied money will be refunded on return of goods.*

**THE RADIOGEM CORPORATION**

**66-S West Broadway New York, N. Y.**


## WRNY for New York Visitors

By CHARLES D. ISAACSON

(*Continued from page* 1125)

WRNY carries a *Church Index*. Every Sunday morning the services at churches of all creeds are announced. Of course, in addition, Dr. Christian F. Reisner preaches. Services are broadcast from Temple Emanu-El, and other religious bodies are heard from. There are Protestant, Jewish and Catholic circles, which are of interest to all faiths. We have as well our "Music of All Religions" period each Sunday afternoon.

A big night was that when the whole company of "The Taming of the Shrew" appeared in the "Up and Down Broadway Review."

I wonder if out-of-towners were with us at the back-stage broadcasting of "Earl Carroll's Vanities," when all the beautiful girls and comedians spoke into the microphone. Frank Tinney was there and told the people he was a lecturer and not a comedian; that he had lectured on the sex of cantaloupes that very afternoon.

## Contents for April Issue of Radio News


The Experimenter's Own T R F Set
By A. P. Peck

This constructional article will be sure to interest all fans who like to experiment with new circuits. This adaptaton of Tuned R.F. is one of the best we have seen.

Other interesting articles in this issue:

Around the World in a Radio Equipped Lifeboat .....By A. Dinsdale
The Phantom Radio Dinner
By G. C. B. Rowe
The Radio Watchman at the Gate
By Dr. K. Schuette
New Developments in Radio Apparatus
By William J. Griffin
A Crystal Hook-up Using Both Halves of the Wave


### A VETERAN OF THE BATON

Did you listen in that night when Romualdo Sapio conducted an operatic period with Louis Stallings, the famous American soprano? Romualdo Sapio was at one time conductor of the Metropolitan Opera House; was on tour as conductor for Patti and for Calve. While he was at the studio, I showed him an old autograph album of my aunt, Kate Brand, who was second leading woman in the Patti company. In this is a page which bears an autograph from Romualdo Sapio to Kate Brand, written in Boston in 1865, so Sapio added "Still Alive and Kicking at 1926."

The Charles D. Isaacson Sunday night concerts continue to be of extreme interest, and are probably the distinctive musical events of our program. For visitors to New York, the invitation is ever extended, that you make it your business to be our guests at these concerts, which are held in De Witt Clinton Hall, at 59th Street and Tenth Avenue.

We broadcast also a card party which was held in The Roosevelt by the Federated Women's City Clubs. There were 1,900 women present. The feature of the afternoon was the grand march of the four hundred presidents of city clubs, and each president spoke a few words into the microphone.

I hope I may meet you all, face to face, soon.

## NOTICE

Sentence in first physics problem page 1009 March issue should read "Aim along line AB to hit the fish" and on page 1038 should read ". . . . necessary to aim behind the fish. . . ."

www.americanradiohistory.com

**IMPORTANT**

**TO NEWSSTAND READERS**

IN order to eliminate all waste and unsold copies it has become necessary to supply newsstand dealers only with the actual number of copies for which they have orders. This makes it advisable to place an order with your newsdealer, asking him to reserve a copy for you every month. Otherwise he will not be able to supply your copy. For your convenience, we are appending herewith a blank which we ask you to be good enough to fill in and hand to your newsdealer. He will then be in a position to supply copies to you regularly every month. If you are interested in receiving your copy every month, do not fail to sign this blank. It costs you nothing to do so.

.....

To ..... Newsdealer

Address .....

Please reserve for me.....copies of SCIENCE & INVENTION every month until I notify you otherwise, and greatly oblige,

Name .....

Address .....



Station
WRNY
NEW YORK
258.5 Meters - 1160 kilocycles
is owned and operated by the publishers of this magazine
Our Editors will talk to you several times every week-
See your Newspaper for details
TUNE IN ON WRNY



# $11,000 for Spirits

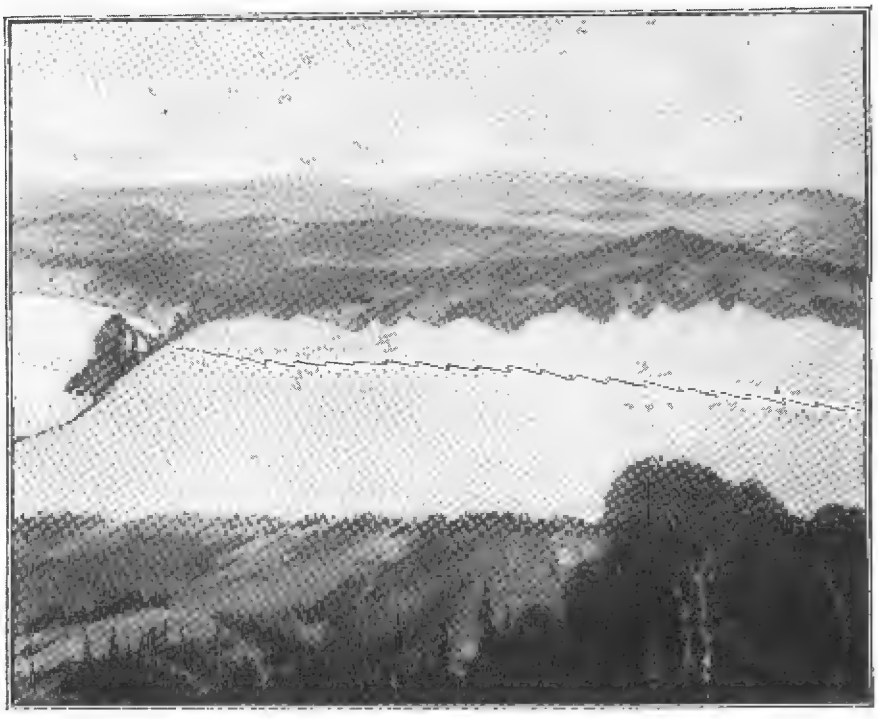
More than two years ago SCIENCE AND INVENTION Magazine offered a prize of $11,000.00 to anyone who could demonstrate his or her ability to communicate with the spirits or to give some definite form of a psychical demonstration which in itself was not trickery.

The result has been that mediums and spiritual organizations have been afraid to place proofs before us. Those weak attempts which have been made to demonstrate psychical phenomena were almost instantly proven fraudulent, and no medium has dared to contradict our findings.

In view of these facts, should we not consider all mediums fraudulent? Should we not consider every psychical manifestation as being trickery pure and simple, intended primarily to fleece those who visit the circle and who find solace in the words from the worst forms of charlatans, namely those who are being permitted to practice upon the poor, seeking words from loved ones?

We have $11,000.00 offered by this publication and Joseph F. Rinn which will be awarded wholly or in part to the one producing a phenomenon devoid of trickery.





A cross section of an underground coal conveyor in a Pennsylvania mine.

# A wheelbarrow four miles long

To meet the colossal demands of the mining industry the General Electric Company produces locomotives and conveyors; it designs motors, large and small, for huge stripping shovels, loaders, fans, pumps, hoists, and undercutting machines—all bearing the monogram G-E.

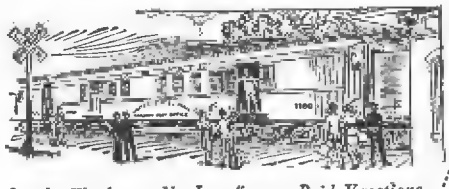
Ten thousand tons of coal a day travel underground on this 4-mile-long conveyor.

With its G-E motors and automatic control it almost runs itself—a thrift example for the whole world.

Somewhere in your factory, office, or home, there is a task that electricity could do better and cheaper.

# GENERAL ELECTRIC





# $1900 to $2700 Year Railway Postal Clerks

Men—Boys 18 Up Travel—See Your Country

Become Mail Carriers Postoffice Clerks

*Steady Work No Layoffs Paid Vacations*

Common Education Sufficient

MAIL COUPON TODAY SURE

COUPON

FRANKLIN INSTITUTE, Dept. P-179, Rochester, N. Y.
Sirs:—Rush to me without charge, (1) Specimen Railway Postal Clerk Examination questions. (2) Send list of U. S. Government jobs now obtainable.

Name .....

Address .....



Insure your copy reaching you each month. Subscribe to Science & Invention—$2.50 a year. Experimenter Publishing Co., 53 Park Place, N. Y. C.


www.americanradiohistory.com

# "There's the *new* Bill Tyson"

## *He's making* $6500 *a year now*

"I USED to know him when I was a kid—we went to grammar school together.

"Then his father died and he had to go to work. Got a job with Brooks & Watson as a clerk, but couldn't seem to get ahead.

"Then overnight something seemed to wake him up. He began making suggestions to the firm—helped them to save a great deal of money.

"Then Old Man Brooks became interested—wanted to know how Bill happened to know so much about the business. Bill told him he'd been studying at home at nights through the International Correspondence Schools. 'H'm,' said Mr. Brooks, 'I'll remember that.'

"He did too. Put Bill out on the road as a salesman for a year or so and then brought him into the main office as sales manager.

"He's getting $6500 a year now and everybody calls him 'the new Bill Tyson.' I've never seen such a change in a man in my life. The I. C. S. deserves a lot of credit."

An International Correspondence Schools course will help *you* just as it helped Bill Tyson. It will help you to have the happy home—the bigger salary—the comforts you'd like to have. Start today to make good. At least find out what this great school can do for you.

*Mail the Coupon for Free Booklet*

INTERNATIONAL CORRESPONDENCE SCHOOLS
Box 6239-D, Scranton, Penna.

*Oldest and largest correspondence schools in the world*

Without cost, please tell me how I can qu'ify for the position or in the subject *before* which I have marked an X:

**BUSINESS TRAINING COURSES**

| | |
|---|---|
| ☐ Business Management | ☐ Salesmanship |
| ☐ Industrial Management | ☐ Advertising |
| ☐ Personnel Organization | ☐ Better Letters |
| ☐ Traffic Management | ☐ Show Card Lettering |
| ☐ Business Law | ☐ Stenography and Typing |
| ☐ Banking and Banking Law | ☐ Business English |
| ☐ Accountancy (including C.P.A.) | ☐ Civil Service |
| ☐ Nicholson Cost Accounting | ☐ Railway Mail Clerk |
| ☐ Bookkeeping | ☐ Common School Subjects |
| ☐ Private Secretary | ☐ High School Subjects |
| ☐ Spanish ☐ French | ☐ Illustrating |

**TECHNICAL AND INDUSTRIAL COURSES**

| | |
|---|---|
| ☐ Electrical Engineering | ☐ Architect |
| ☐ Electric Lighting | ☐ Architects' Blueprints |
| ☐ Mechanical Engineer | ☐ Contractor and Builder |
| ☐ Mechanical Draftsman | ☐ Architectural Draftsman |
| ☐ Machine Shop Practice | ☐ Concrete Builder |
| ☐ Railroad Positions | ☐ Structural Engineer |
| ☐ Gas Engine Operating | ☐ Chemistry ☐ Pharmacy |
| ☐ Civil Engineer | ☐ Automobile Work |
| ☐ Surveying and Mapping | ☐ Airplane Engines |
| ☐ Metallurgy ☐ Mining | ☐ Agriculture and Poultry |
| ☐ Steam Engineering ☐ Radio | ☐ Mathematics |

Name.....
Street Address..... 6-26-25
City..... State.....
Occupation.....

*If you reside in Canada, send this coupon to the International Correspondence Schools Canadian Limited, Montreal*

## *Earn big money as an automobile mechanic*

The automobile field needs trained men. Big-pay jobs are open. Auto mechanics earn up to $75 a week. Train yourself for one of these big-pay jobs with the aid of these books. They tell everything you have to know.

**SENT FOR 10 DAYS' FREE EXAMINATION**

Examination is absolutely free, I understand. All shipping charges are paid by you and I do not pay a cent unless I keep the books.

McGRAW-HILL BOOK CO., Inc.,
370 7th Avenue, N. Y.

Send me the **Practical Automobile Library** for 10 days' free examination. If I decide to keep the books, I agree to send you $1.50 in 10 days and $2.00 a month until the full price $13.50—is paid. If I do not want to keep the set, I will return it at your expense.

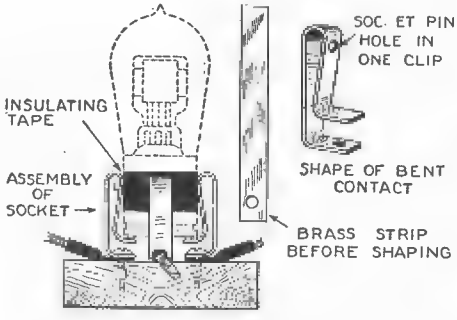
Name .....
Address .....
Position .....
Company .....S&I 4-1-26

GET READY FOR BIG-PAY AUTO JOB


# RADIO WRINKLES

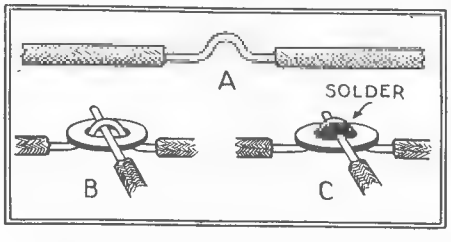
UNDER this heading we are going to publish items of interest to everyone who likes to build radio instruments. In order to continue this department it is necessary for our readers to tell us about their latest experiments. Write us a short description of some time- or money-saving kink you have discovered and send it to us along with a few sketches. Our regular rates will be paid for this material. Be brief and try to put everything in the drawing. Don't be too elaborate. Address "RADIO WRINKLES" Editor, care of SCIENCE AND INVENTION.

## Socket



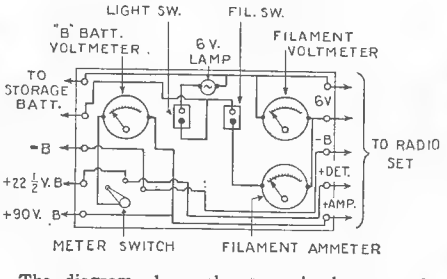

A very good type of low loss socket that is easy to make and that will give exceptional results is illustrated above. This can be adapted to any type of tube. When a bakelite base type tube is employed, the insulating tape will not be found necessary. The socket pin hole is drilled in only one of the clips.—George A. Luers.

## Neat Connections



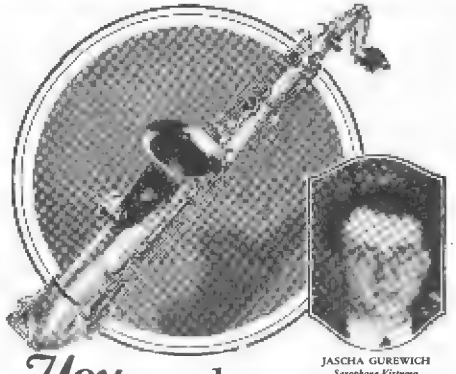

To make very neat and efficient connections, remove the insulation from the wires to be joined, bend the one that is to be tapped as at A; slip a washer over it and the end of the other wire through the loop as at B and sweat solder into the entire assembly as at C.—William H. Lee.

## Charging Panel




The diagram above shows a simple type of battery testing panel. Meters and switches are supplied so that a constant check can be kept on all of the batteries. A six-volt lamp mounted on the switchboard serves to illuminate the instruments. The "B" battery may be tested in sections by manipulating the switch.—Author please send address.

FREE!
To Each Purchaser of a WORLD 6 V. Auto or Radio BATTERY
12-Cell — 24-Volt Storage 'B' Battery
Positively given free with each purchase of a WORLD "A" Storage Battery. You must send this ad with your order. WORLD Batteries are famous for their guaranteed quality and service. Backed by years of successful manufacture and thousands of satisfied users. Equipped with Solid Rubber Case, an insurance against acid and leakage. You save 50 per cent and get a
2-Year Guarantee Bond in Writing
WORLD Battery owners "tell their friends." That's our best proof of performance. Send your order in today.
Solid Rubber Case Radio Batteries
6-Volt, 100-Amperes ..... $11.25
6-Volt, 120-Amperes ..... 13.25
6-Volt, 140-Amperes ..... 14.00
Solid Rubber Case Auto Batteries
6-Volt, 11-Pla e ..... $11.25
6-Volt, 13-Plate ..... 13.25
12-Volt, 7-Plate ..... 16.00
Send No Money Just state battery wanted and we will ship day order is received, by Express C. O. D., subject to your examination on arrival. FREE "B" Battery included. Extra Offer: 5 per cent discount for cash in full with order. Buy now and get a guaranteed battery at 50 per cent saving to you.
WORLD BATTERY COMPANY
1219 So. Wabash Ave., Dept. CHICAGO, ILL.
Approved and Listed as Standard by Leading Authorities including Radio News Laboratories, Popular Science Institute of Standards, Popular Radio Laboratories, Radio Broadcast Laboratories, Radio in the Home, and Lefax, Inc.
World STORAGE BATTERIES
Set your Radio Dial at 210 meters for the new 1000 w. World Storage Battery Station, WSBC, Chicago. Watch for announcements.
KDKA · WEAF · WHN · WJZ · KHJ · WJY · KOP



*You* can play

JASCHA GUREWICH
*Saxophone Virtuoso Formerly with Sousa's Band New York City*

this easy fingering Buescher Saxophone. Most wonderful music. 3 lessons given on request with each new Buescher True-Tone. Teach yourself. Many play scales right off—easy tunes first week. You can.

*Easy to Play, Easy to Pay* 325

Try any Buescher Instrument for 6 days. Satisfaction or no sale. Easy terms arranged. Send postal for catalog and details of trial and payment plans. Mention instrument preferred. No obligation. Send today.

BUESCHER BAND INSTRUMENT CO.
1534 Buescher Block Elkhart, Indiana

LEARN TENOR BANJO

BANJOISTS! Earn big money through Charles McNeil's famous Home Study Banjo Course. Simple as A B C—yet has all technical requirements. Includes phonograph records, demonstrating jazz strokes, "breaks" and chords, played by Charles McNeil, 5 years with Isham Jones-Brunswick Records. Easy payments. Send for Free Book.

CHARLES McNEIL, Director, Chicago Tenor Banjo Institute, Dept. 1954
1621 N. Lincoln St., Chicago, Ill.

500 TRICKS

Be Popular — Learn to Entertain!

Fool your friends. Earn money at Clubs and Parties. Easy to learn. No skill required. Write today for Free 64-page Illustrated Book that explains 33 Tricks you can do, together with Catalog of 500 Tricks, Puzzles, Jokes and European Novelties at lowest prices. Enclose 4c postage.

LYLE DOUGLAS, Sta. A-3, Dallas, Tex.


www.americanradiohistory.com

## Can the Dead Be Re-united?

By HUGO GERNSBACK

(*Continued from page* 1089)

The fastest thing we know of on earth is light. It may be doubted that there is anything faster than light, although some scientists believe that gravitation travels faster. It would take a beam of light traveling at the rate of 186,500 miles per second, one minute and 54 seconds to travel the distance these souls would occupy, providing they were in line, close to each other and measured only one-eighth of an inch in their largest dimensions.

If we assume that the souls can not immediately communicate with each other, we may liken the problem to taking a bottle and throwing it into the ocean, in the hope that another bottle thrown into the ocean at the same spot two or more years later will meet the first one. What are the chances? They may be stated as follows:

If a bottle 4 5/16 inches in diameter were thrown into the Atlantic Ocean, which has an area of 41,321,000 square miles; there would be one chance in 115,096,336,640,000 of finding it.

We may explain this in another way, as follows:

If your vision were restricted to an area of the diameter of 4 15/16 inches, and you looked in eleven places, it would be just as easy for you to find that bottle dropped at random into the Atlantic Ocean, as it would be to communicate with one of the souls which have passed into the Great Beyond. In other words, the chance would be practically nil.

We may explain it in still another way, as follows:

### $11,000.00 Challenge

**SCIENCE & INVENTION and Joseph F. Rinn will pay this amount for positive demonstration before our experts of spirit manifestations, ectoplasm, spirit slate writing, et cetera. Read details of our challenge in August, 1923 issue of SCIENCE & INVENTION.**

Take a pyramid of hay, measuring 300 feet square and 900 feet high. It would be just as easy to find a needle two and a half inches long in this pyramid as to find a soul that has passed on.

Again, the man of religion will tell me that all these figures are meaningless, because he will say that once you are dead you are dead a long time, as the popular saying goes. As a matter of fact, as I have mentioned in previous writings, there is no such thing as time in empty space. For that reason it would not make any difference how long it would take for two souls to reunite, even with these tremendous handicaps. Even though there were not one chance in a billion trillions of finding a certain soul, if we allowed enough time, say a billion trillion years, the two souls would, in the end, certainly meet, because, given infinite time, the chances of meeting naturally become unlimited.

It is also interesting to note here what the mass of the ten trillion human beings who have died during the last 250,000 years would look like. For purposes of illustration, I have had the following data computed:

Mount Everest, the highest peak on earth, is 5½ miles high, and has never been scaled. If we were to take all of the bodies of the human beings who have died for 250,000 years, and arrange them in the form of a pyramid, we would create a mountain that would dwarf into insignificance Mount Everest. The pyramid would be 19½ miles high, and would have a base of 6½ miles, a structure so large that it staggers the imagination.


*As it should be*

SINCE its extra cost, when spread over its billions of output, figures to but three cents per package of twenty, it is quite fair to say that Fatima, in between 'costly' and 'popular' in price, is decidedly more popular than costly

FATIMA

*"What a whale of a difference just a few cents make"*

LIGGETT & MYERS TOBACCO CO.

Free 60-page Reference Book

Mailing List Catalog No. 55

**Get Business by Mail**

60 pages of vital business facts and figures. Who, where and how many your prospects are.
8,000 lines of business covered. Compiled by the Largest Directory Publishers in the world, thru information obtained by actual door-to-door canvass.
Write for your FREE copy.

**R. L. POLK & CO., Detroit, Mich.**
880 POLK DIRECTORY BLDG.
Branches in principal cities of U. S.

**Battery Prices SMASHED!**

**To Consumers Only**

Here is a real battery quality, *guaranteed* to you at prices that will astound the entire battery-buying public. **Order Direct From Factory.** Put the Dealer's Profit in your own pocket. You actually save much more than half, and so that you can be convinced of true quality and performance, we give a *Written 2-Year Guarantee.* Here is your protection! No need to take a chance. Our battery is right—and the price is lowest ever made. Convince yourself. Read the prices!

| Auto Batteries | | Radio Batteries | |
|---|---|---|---|
| 6Volt,11 Plate, | $8.50 | 6Volt,100 Amp. | $8.50 |
| 6Volt,13 Plate, | $10.25 | 6Volt,120 Amp. | $10.25 |
| 12Volt, 7 Plate, | $11.75 | 6Volt,140 Amp | $11.75 |

**Buy Direct—Send No Money**

We ask no deposit. Simply send name and address and style wanted. Battery will be shipped same day we receive your order Express C.O.D. subject to your examination on arrival. Our guarantee accompanies each battery. We allow 5% discount for cash in full with order. You cannot lose! Send your order today —NOW!

**ARROW BATTERY CO.**
Dept. 14 1215 So. Wabash Ave., Chicago


www.americanradiohistory.com

CHICAGO
TECHNICAL
COLLEGE

Drafting
Engineering
Electricity
and Architecture

22nd Year

A MAXIMUM of practical training in a minimum of time is offered you by one of **"America's oldest and largest schools of specialized engineering"** . . . technical training of college standard for men who have neither the time, money nor preliminary education to attend a university. Over 1000 men enroll each year in day and evening classes.

**Short, Intensive Training**

of a very practical sort puts you immediately into a high salaried position. Many of our students are assisted to responsible positions before graduation . . . they earn while they learn.

Chicago Technical College Bldg.

**If you can't come to Chicago STUDY AT HOME**

Ten months from today you can be a trained draftsman...Trained men are in demand...at high salaries. Enter a profession, without sacrificing time. Study

**DRAFTING**

In your spare time...We have been giving technical training for 22 years...Instructors are experts, the same instructors as in the resident school.

**FREE TRIAL LESSON**

To see how much you will like this high-grade profession, and

**FREE OUTFIT**

a regular $25 draftsman's outfit is included in the price of the course.

**Send for 40-Page Book**

of facts about drafting... send for it... free. Write today for the Free trial lesson in drafting, sample drawings made by students and the book of information. Address Dept 445

Courses are arranged to suit your needs; 2-year diploma; 3-year B. S. degree; special short courses adapted to the individual. Instructors are experts, actively at work in the very professions they teach. Tuition is low, terms easy. Enter any time.

**Write for Free 72-Page Blue Book**

It tells about the courses (full descriptions); about the great demand for Chicago Technical College trained men; about college athletics and other interesting facts you'll want to know. Send for the Blue Book now, without obligation! Address

Chicago TECHNICAL College
**Dept. 59, 118 East 26th St., Chicago**



When a better PHOTO-ELECTRIC CELL is announced it will bear the trade-mark

PHOTOTRON

The new, sensitive, and practical alkali-metal tube for picture telegraphy and a thousand other uses.

FOR DESCRIPTIVE LITERATURE WRITE **$20.00 ea.**

**PHOTION ELECTRIC CORPORATION**

247 Park Ave. New York City
1269 Cochran Ave. Los Angeles, Cal.


# Broadcast Calls

*(Corrected to date)*

| Call Letters | Location and Name | Power & Wave Length |
|---|---|---|
| KDKA | East Pittsburgh, Pa., Westinghouse Electric & Mfg. Co. | Variable—309.1 |
| KDLR | Devils Lake, N. D., Radio Electric Co. & Wilson Insurance Agency | 5—231 |
| KDPM | Cleveland, Ohio, Westinghouse Electric & Mfg. Co. | 500—250 |
| KDYL | Salt Lake City, Utah, Newhouse Hotel | 50—246 |
| KDZB | Bakersfield, Calif., Frank E. Siefert | 100—209.7 |
| KFAB | Lincoln, Neb., Nebraska Buick Auto Co. | 1000—340.7 |
| KFAD | Phoenix, Ariz., McArthur Bros. Mercantile Co. | 100—273 |
| KFAF | San Jose, Calif., Montgomery Hotel | 50—217.3 |
| KFAJ | Boulder, Colo., University of Colorado | 100—261 |
| KFAU | Boise, Idaho, Boise High School | 750—280-2 |
| KFBB | Havre, Mont., F. A. Buttrey & Co. | 50—275 |
| KFBC | San Diego, Calif., W. K. Azbill | 10—224 |
| KFBK | Sacramento, Calif., Kimball-Upson Co. | 100—248 |
| KFBL | Everett, Wash., Leese Bros. | 100—224 |
| KFBS | Trinidad, Colo., School District No. 1 | 15—238 |
| KFBU | Laramie, Wyo., The Cathedral (Bishop N. S. Thomas) | 50—270 |
| KFCB | Phoenix, Ariz., Nielson Radio Supply Co. | 100—238 |
| KFDD | Boise, Idaho, St. Michaels Cathedral | 50—278 |
| KFDM | Beaumont, Tex., Magnolia Petroleum Co. | 500—315.6 |
| KFDX | Shreveport, La., First Baptist Church | 100—250 |
| KFDY | Brookings, S. Dak., South Dakota State College of Agriculture and Mechanic Arts | 100—273 |
| KFDZ | Minneapolis, Minn., Harry O. Iverson | 10—231 |
| KFEC | Portland, Ore., Meier & Frank Co. | 50—248 |
| KFEL | Denver, Colo., Winner Radio Corp. | 50—254 |
| KFEQ | Oak, Nebr., Scroggin & Co. Bank | 500—268 |
| KFEY | Kellogg, Idaho, Bunker Hill & Sullivan Mining & Concentrating Co. | 10—233 |
| KFFP | Moberly, Mo., First Baptist Church | 50—242 |
| KFFY | Alexandria, La., Louisiana College | 50—275 |
| KFGC | Baton Rouge, La., Louisiana State University | 100—268 |
| KFGH | Stanford University, Calif., Leland Stanford Junior University | 500—270 |
| KFGQ | Boone, Iowa, Crary Hardware Co. | 10—226 |
| KFH | Wichita, Kan., Hotel Lassen Rigby—Gray Hotel Co. | 50—268 |
| KFHA | Gunnison, Colo., Western State College of Colorado | 50—252 |
| KFHL | Oskaloosa, Iowa, Penn College | 10—240 |
| KFI | Los Angeles, Calif., Earle C. Anthony (Inc.) | 3000—468.5 |
| KFIF | Portland, Ore., Benson Polytechnic Institute | 100—248 |
| KFIO | Spokane, Wash., North Central High School | 100—265.3 |
| KFIQ | Yakima, Wash., First Methodist Church | 100—256 |
| KFIU | Juneau, Alaska, Alaska Electric Light & Power Co. | 10—226 |
| KFIZ | Fond du Lac, Wis., Daily Commonwealth and Wisconsin Radio Sales, Inc. | 100—273 |
| KFJB | Marshalltown, Iowa, Marshall Electric Co. | 10—248 |
| KFJC | Junction City, Kansas, Episcopal Church (R. B. Fegan) | 10—218.8 |
| KFJF | Oklahoma, Okla., National Radio Mfg. Co. | 500—261 |
| KFJI | Astoria, Ore., Liberty Theatre | 10—246 |
| KFJM | Grand Forks, N. Dak., University of North Dakota | 100—278 |
| KFJR | Portland, Oregon, Ashley C. Dixon & Son | 50—263 |
| KFJX | Cedar Falls, Iowa, Iowa State Teachers' College | 50—258 |
| KFJY | Fort Dodge, Iowa, Tunwall Radio Co. | 50—246 |
| KFJZ | Fort Worth, Tex., South-Western Baptist Theological Seminary | 50—254 |
| KFKA | Greeley, Colo., Colorado State Teachers' College | 50—273 |
| KFKU | Lawrence, Kans., University of Kansas | 500—275 |
| KFKX | Hastings, Nebr., Westinghouse Electric & Mfg. Co. | 5000—288.3 |

*(Continued on page 1153)*

*Patrick Conway famous bandmaster uses and endorses Conns*

**Use Your Talent, Now**

That longing to play some instrument, to express yourself in music, can be quickly and easily gratified. Choose any Conn instrument, you'll win pleasure and profit in the shortest time. Remember Conn is the only maker of every instrument for the band.

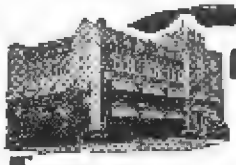
Endorsed by foremost artists for *beauty of tone, perfect scale, reliable action.*

**Free Trial; Easy Payments.** Write for free book "Success in Music" and details of trial offer. Mention instrument.

C. G. CONN, Ltd.
456 Conn Bldg., Elkhart, Ind.

CONN BAND INSTRUMENTS
WORLD'S LARGEST MANUFACTURERS





**High School Course in 2 Years**

This simplified, complete High School Course—specially prepared for home study by leading professors—meets all requirements for entrance to college, business, and leading professions.

**20 Other Courses**

Over 200 noted Engineers, Business Men, and Educators helped prepare the special instruction which you need for success. No matter what your inclinations may be, you can't hope to succeed without specialized training. Let us give you the practical training you need.

**American School**
Drexel Ave. & 58th Street
Dept. H- 426 Chicago

**Money Back When You Finish If Not Satisfied**

American School, Dept H- 426 Drexel Ave. and 58th St., Chicago

**Send me full information on the subject checked and how you will help me win success in that line.**

| | |
|---|---|
| ..... Architect | .....Electrical Engineer |
| .....Building Contractor | .....General Education |
| .....Automobile Engineer | ..... Lawyer |
| .....Civil Engineer | .....Mach. Shop Practice |
| .....Structural Engineer | .....Mechanical Engineer |
| .....Business Manager | .....Steam Engineer |
| .....C. P. A. & Auditor | .....Sanitary & Heating |
| .....Bookkeeper | .....Surveyor & Mapping |
| .....Draftsman & Designer | .....High School Graduate |

Name.....

Address.....



**BUY DIRECT SAVE HALF**

GRADE A QUALITY GOODS at WHOLESALE

SEND for FREE BOOK

Any handy man can install his own plumbing and heating by our new, easy method. FREE installing plans show you how. You save waste and high labor cost with our cut-to-fit system. Fifty years of economy service to home owners, farmers, builders and mechanics. Million dollar plants behind our guarantee. FREE BOOK shows everything in plumbing and heating fixtures and supplies. Write today for copy.

HARDIN-LAVIN COMPANY
104-14 West Pershing Road, Chicago, Ill.

ESTABLISHED 1876



*You can be quickly cured, if you*

**STAMMER**

Send 10 cents for 288-page book on Stammering and Stuttering, "Its Cause and Cure." It tells how I cured myself after stammering 20 yrs. B. N. Bogue.
8127 Bogue Bldg., 1147 N. Ill. St., Indianapolis


www.americanradiohistory.com

| Call Letters | Name | Location | Power & Wave Length |
|---|---|---|---|
| KFKZ | Kirksville, Mo., F. M. Henry | | 10—266 |
| KFLR | Albuquerque, N. Mex., University of New Mexico | | 100—254 |
| KFLU | San Benito, Tex., San Benito Radio Club | | 10—236 |
| KFLV | Rockford, Ill., Swedish Evangelical Mission Church | | 100—229 |
| KFLX | Galveston, Tex., George R. Clough | | 10—240 |
| KFLZ | Anita, Iowa, Atlantic Automobile Co. | | 100—273 |
| KFMQ | Fayetteville, Ark., University of Arkansas | | 750—299.8 |
| KFMR | Sioux City, Iowa, Morningside College | | 100—261 |
| KFMW | Houghton, Mich., M. G. Sateren | | 50—263 |
| KFMX | Northfield, Minn., Carleton College | | 500—336.9 |
| KFNF | Shenandoah, Iowa, Henry Field Seed Co. | | 500—263 |
| KFOA | Seattle, Wash., Rhodes Dept. Store | | 1000—454.3 |
| KFOB | Burlingame, Calif., KFOB inc. (Albert Sherman) | | 50—226 |
| KFON | Long Beach, Calif., Echophone Radio Shop | | 500—233 |
| KFOO | Salt Lake City, Utah, Latter Day Saints University | | 250—236 |
| KFOR | David City, Nebr., David City Tire & Electric Co. | | 100—226 |
| KFOT | Wichita, Kans., College Hill Radio Club (College Hill Methodist Church) | | 50—231 |
| KFOX | Omaha, Nebr., Technical High School | | 100—248 |
| KFOY | St. Paul, Minn., Beacon Radio Service | | 50—252 |
| KFPL | Dublin, Texas, C. C. Baxter | | 15—252 |
| KFPM | Greenville, Texas, New Furniture Co. | | 10—242 |
| KFPR | Los Angeles, Calif., Los Angeles County Forestry Department | | 500—230.6 |
| KFPW | Carterville, Mo., St. Johns M. E. Church | | 20—258 |
| KFPY | Spokane, Wash., Symons Investment Co. | | 100—266 |
| KFQA | St. Louis, Mo., The Principia | | 100—261 |
| KFQB | Fort Worth, Texas, Searchlight Publishing Co. | | 1000—263 |
| KFQD | Anchorage, Alaska, Chovin Supply Co. | | 100—227.1 |
| KFQP | Iowa City, Iowa, George S. Carson, Jr. | | 10—224 |
| KFQU | Alma (Holy City), Calif., W. E. Riker | | 100—217.3 |
| KFQW | North Bend, Wash., C. F. Knierim | | 50—215.7 |
| KFQZ | Hollywood, Calif., Taft Products Co. | | 50—225.4 |
| KFRB | Beeville, Tex., Hall Brothers | | 250—248 |
| KFRC | San Francisco, Calif., City of Paris Dry Goods Co. | | 50—268 |
| KFRU | Columbia, Mo., Stephens College | | 500—499.7 |
| KFRW | Olympia, Wash., United Churches of Olympia | | 50—218.8 |
| KFSG | Los Angeles, Calif., Echo Park Evangelistic Assn. | | 500—275 |
| KFUL | Galveston, Tex., Thomas Goggan & Bros. Music Co. | | 50—258 |
| KFUO | St. Louis, Mo., Concordia Seminary | | 500—545.1 |
| KFUP | Denver, Colo., Fitzsimons General Hospital | | 50—234 |
| KFUR | Ogden, Utah, Peery Building Co. | | 50—224 |
| KFUS | Oakland, Calif, Louis L. Sherman | | 50—256 |
| KFUT | Salt Lake City, Utah, University of Utah | | 100—261 |
| KFUU | Oakland, Calif., Colburn Radio Labs | | 50—220 |
| KFVD | San Pedro, Calif., McWhinnie Electric Co. | | 50—205.4 |
| KFVE | St. Louis, Mo., Film Corporation of America | | 500—240 |
| KFVG | Independence, Kansas, First Methodist Epis. Church | | 15—236 |
| KFVH | Manhattan, Kansas, Whan Radio Shop | | 15—218.8 |
| KFVI | Houston, Texas, Fifty-sixth Brigade, Headquarters Troop | | 10—240 |
| KFVN | Welcome, Minn., Carl E. Bagley | | 50—227 |
| KFVR | Denver, Colo., (near) Moonlight Ranch, Route 6, Eugene Rossi | | 50—244 |
| KFVS | Cape Girardeau, Mo., Cape Girardeau Battery Station, Oscar C. Hirsch | | 50—224 |
| KFVW | San Diego, Calif., Airfan Radio Corp. | | 500—246 |
| KFVV | Albuquerque, N. Mex., Radio Supply Co. | | 10—250 |

NO DAYS FREE TRIAL

GREATEST VALUE $2.98 EVER OFFERED

THE NEW IMPROVED INKOGRAPH

*The Perfect Writing Instrument*

Answers the purpose of both pen and pencil combined. Its point is shaped like a fine lead pencil point and writes with ink free and easy without a miss, skip or blur.

The steady uniform flow of ink actually improves your handwriting. Won't blot, scratch, leak or soil hands.

**COMBINES THE BEST FEATURES**

of pen and pencil, minus the weak points, of both plus improvements found in neither. The lead pencil smudges, the point breaks and its writing soon is obliterated. Most fountain pens skip, scratch, flood, clog, leak, blot, soil hands and clothing. The old stylographic ink pencil dries up, balks, blots, writes heavy, flows unevenly and is never reliable. The Inkograph feeds as fast and uniform on the 20th page as it did on the first.

**CANNOT LEAK**

Not the tiniest drop of ink will spill although one filling is sufficient to write thousands of words.

**MAKES 3 TO 4 CARBON COPIES**

at one time with original copy in ink. Bear down as hard as you like, without fear of bending, spreading, injuring or distorting its point.

**DRAWS LINES TO A RULER**

without smearing, smudging or blurring the paper. Use any color ink.

**REQUIRES NO BLOTTER**

The ink dries as fast as you write, because the flow is fine, even and uniform.

**PATENT AUTOMATIC FEED**

Prevents clogging. No complicated mechanism to clean or get out of order. A year's guarantee certificate with full directions accompanies each Inkograph and is your absolute protection.

**AN INSTRUMENT OF REFINEMENT**

In appearance it is extremely attractive. Its beautifully highly polished finest quality of hard rubber, its 14Kt solid gold point and feed, gold band on safety screw cap, gold self filling lever and gold clip make it an instrument of distinctive elegance and refinement. The equal in size, workmanship and material of a $7, $8 or $9 fountain pen. Also made in ladies' size.

**SEND NO MONEY**

Your name and address and the style number of the Inkograph of your choice are sufficient. Pay postman $2.98 plus postage on delivery. Specify if you want ladies' size. When cash accompanies order Inkograph will be sent postage prepaid. If within ten days the Inkograph does not prove satisfactory return it and we'll refund your money.

**INKOGRAPH CO., Inc.**
**37-151 Centre St., - New York**

STYLE No. 17 A. 7 The Executive, an ebony black rubber, highly polished Inkograph of superb refinement, the choice of men of affairs.

STYLE No. 20 A. 7 The Big Chief, made of highest quality red rubber, a large sturdy attractive Inkograph.

Illustrations Actual Size

STYLE No. 6 A. 7 The X Ray Inkograph, barrel made of transparent amber material which makes it possible to see how much ink it contains. Has large ink capacity. Filled with ink dropper, not a self filler.

The Writing Hemisphere DEALERS Send for catalog and trade prices.

The INKOGRAPH ACCOMPLISHMENT

That 14Kt solid gold hard smooth round ball-like point, which glides with ease over the coarsest paper and makes it possible to write ink as rapidly as with the softest lead pencil.

Illustrations Actual Size

STYLE No. 19 A 7 The Big Chief, made of mottled rubber which is black and red rubber artistically blended producing an effect of extreme beauty and refinement.

**AGENTS** Sell Inkographs, make bigger profits, more sales, without investment. Quicker commissions, popular prices, no competition. Send for an Inkograph or write for special sales plan booklet.

# WANTED

MEN TO MANUFACTURE METAL TOYS AND NOVELTIES

Good chance to start your own well-paying business producing such big sellers as Toys, Novelties, Ash Trays, Book-blocks, Souvenirs, Advertising Specialties, Paper Weights, etc. We furnish forms with complete outfit for speedy production. Absolutely no experience or tools necessary; no special place needed. Small investment puts you on road to success. Demand exceeds supply and we assist you and co-operate with our manufacturers in selling their products. We put you in touch with the buyers and assure an outlet for your goods. Strictly a business proposition and thorough investigation invited. A splendid opportunity for an enormous and profitable business for ambitious men. No others need apply. Catalog and information mailed on request.

**METAL CAST PRODUCTS CO.**
**1696 Boston Road, New York**

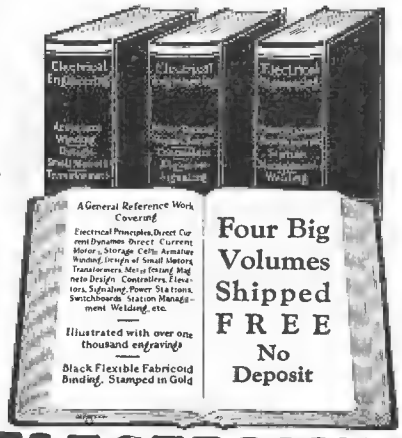
**KESTER**
READY TO USE
**METAL MENDER**
*The Household Solder*

Here's why thousands use Kester Metal Mender.
*Simple*—"Requires Only Heat" Anyone can use it.
*Safe*—No messy pots or dangerous acids.
*Sure*—Genuine Solder makes firm metal joints.
*Satisfactory*—Works equally well on light or heavy, old or new work.
*Economical*—Saves many times its price.
*Your Dealer Can Supply You*

Soldering Booklet **"It's a Cinch to Solder"** *Upon Request*

**CHICAGO SOLDER COMPANY**
4201-341 Wrightwood Ave., Chicago, U.S.A.


www.americanradiohistory.com


A General Reference Work Covering
Four Big Volumes Shipped FREE No Deposit
Illustrated with over one thousand engravings
Black Flexible Fabricoid Binding. Stamped in Gold

# ELECTRICITY
## *and How to Make it Pay*
## BIG! FOUR BIG BOOKS TELLING HOW

Your future lies before you. Between the covers of these four big books, filled with money-making facts, you may find the answer to all your problems. You will find them a veritable gold mine of facts on electricity, facts which RAISE MEN'S PAY. No need to spend long hours in grinding study if you know where to find the things you want to know *when you need them.*

### SHORT ROAD TO SUCCESS

There is a shorter road than years of study and experience. Learn in an hour what someone else experimented on for a year. Let him tell you how he did it, look at the drawings others have made and learn from them. It's easy if you have these special volumes arranged for ready reference. These books were published for busy men, men who want to get ahead with the least waste of time. You'll find them a big help no matter what your present job or station in life.

### COMPLETE IN EVERY WAY

This is the most complete 4-volume set of Electrical Engineering we have ever published. No such value has ever been offered here. Brimful of interesting and instructive electrical subjects, hundreds of drawings, blue prints and photographs. A marvelous array of *pay-building* material, but so simply told and so easily understood that anyone will enjoy them. Over 2000 pages bound in flexo covers.

### AMAZING NEW PRICE

Never in our history have we offered so great a bargain. The price of only $9.90 for these splendid books is something new in our experience, and we, therefore, reserve the right to withdraw this offer any time, after 30 days.

### SHIPPED FREE

Our plan brings these four splendid volumes within the reach of every one. You don't send us a single penny—you don't make any deposit with us—just send your name and address and we'll send the complete set bound in special "flexo" covers. Read them carefully. Keep them 10 days, then send only $1.90, and then $2.00 per month for only 4 months—there is nothing more to pay us, the books will be yours.

**AMERICAN TECHNICAL SOCIETY,**
**Automobile Division E425 Chicago, Ill.**

You may send me your complete Automobile Engineering library, 4 big volumes bound in flexo covers, with the understanding that I am to have 10 days to decide if I want to keep them. I will either return them then or send you $1.90 then and $2.00 per month until the special low price of $9.90 is paid.

*Name* _____

*Address* _____

*City* _____ *State* _____

*Reference* _____

## Returns its Cost OVER AND OVER

### The "Trousers' Friend"

BEFORE USING TROUSERS FRIEND — AFTER USING TROUSERS FRIEND

This scientific device made of everlasting steel, nickel plated, positively removes baggy knees and automatically preserves the creases without pressing, without dampening and so easily that anyone can adjust it in a moment. Hang your trousers in a "Trousers' Friend" in the evening and put them on spick and span in the morning. Takes very little room in grip. Works equally well at home, in Hotel or Pullman.

**Order One To-Day; Send No Money**

Pay the Postman $1.75 and postage. Use it thirty days. If not satisfactory your money returned. If you remit with order we pay postage.

NELSON MANUFACTURING COMPANY
55 New-Montgomery St. San Francisco

Secure An Agency. The "Trousers' Friend" is filling a World need. We want you to present it to millions waiting for it. Write to-day.

**Tire Agents Wanted** Use and introduce MELLINGER CORD TIRES **15,000 MILES GUARANTEED**

Lowest Wholesale Prices in America. Shipped prepaid on approval. Make big money all or part time. No capital or experience. Sample sections furnished. **YOUR TIRES FREE!** Simply send name today for FREE BOOK, tells how thousands do big business. Special Agents' Offer, Wholesale Prices and FREE Sample Kit. **MELLINGER TIRE & RUBBER CO.** Dept. 411 Philadelphia, Pa., or Kansas City, Mo.


| Call Letters | Name | Location | Power & Wave Length |
|---|---|---|---|
| KFWA | Ogden, Utah, Browing Bros. Co. | | 500—261 |
| KFWB | Hollywood, Calif., Warner Bros. Pictures (Inc.) | | 500—252 |
| KFWC | Upland, Calif., L. E. Wall | | 50—211.1 |
| KFWF | St. Louis, Mo., St. Louis Truth Center | | 250—214.2 |
| KFWH | Chico, Calif., F. Wellington Morse, Jr. | | 100—254 |
| KFWI | South San Francisco, Calif., Radio Entertainments (Inc.) | | 500—226 |
| KFWM | Oakland, Calif., Oakland Education Society | | 500—206.8 |
| KFWO | Avalon, Calif., Lawrence Mott | | 250—211.1 |
| KFWU | Pineville, La., Louisiana College | | 100—238 |
| KFWV | Portland, Ore., Wilbur Jerman | | 50—212.6 |
| KFXB | Big Bear Lake, Calif., Bertram O. Heller | | 500—202.6 |
| KFXC | Santa Maria, Calif., Santa Maria Valley R. R. Co. | | 100—209.7 |
| KFXD | Logan, Utah, Service Radio Co. | | 10—205.4 |
| KFXF | Colorado Springs, Colo., Pikes Peak Broadcasting Co. | | 500—250 |
| KFXH | El Paso, Texas, Bledsoe Radio Co. | | 50—242 |
| KFXJ | Denver, Colo., Mountain States Radio Distributors, Inc. (Portable) | | 10—215.7 |
| KFXM | Beaumont, Texas, Neches Electric Co. | | 10—227 |
| KFXR | Oklahoma, Okla., Classen Film Finishing Co. | | 15—214.2 |
| KFXY | Flagstaff, Ariz. (Orpheum Theatre), Mary M. Costigan | | 50—205.4 |
| KFYF | Oxnard, Calif., Carl's Radio Den (Newcomb Radio Co.) | | 10—205.4 |
| KFYJ | Houston, Tex., Houston Chronicle Publishing Co. (Portable) | | 10—238 |
| KFYO | Texarkana, Tex., Buchanan-Vaughan Co. | | 10—209.7 |
| KFYR | Bismarck, N. Dak., Hoskins-Meyer, Inc. | | 10—248 |
| KGO | Oakland, Calif., General Electric Co. | | 4000—361.2 |
| KGTT | San Francisco, Calif., Glad Tidings Tabernacle | | 50—206.8 |
| KGU | Honolulu, Hawaii, Marion A. Mulrony | | 500—270 |
| KGW | Portland, Ore., Portland Morning Oregonian | | 500—491.5 |
| KGY | Lacey, Wash., St. Martins College | | 50—246 |
| KHJ | Los Angeles, Calif., Times-Mirror Co. | | 500—405.2 |
| KHQ | Spokane, Wash, Louis Wasmer | | 500—273 |
| KJBS | San Francisco, Calif., Julius Brunton & Sons Co. | | 5—220 |
| KJR | Seattle, Wash., Northwest Radio Service Co. | | 1000—384.4 |
| KLDS | Independence, Mo., Reorganized Church of Jesus Christ of Latter Day Saints | | 1000—440.9 |
| KLS | Oakland, Calif., Warner Bros. Radio Supplies Co. | | 250—250 |
| KLX | Oakland, Calif., Oakland Tribune | | 500—508.2 |
| KLZ | Denver, Colo., Reynolds Radio Co. | | 250—266 |
| KMA | Shenandoah, Iowa, May Seed & Nursery Co. | | 500—252 |
| KMJ | Fresno, Calif., Fresno Bee | | 50—234 |
| KMMJ | Clay Center, Neb., M. M. Johnson Co. | | 1000—228.9 |
| KMO | Tacoma, Wash., Love Electric Co. | | 100—250 |
| KMOX | Kirkwood, Mo., Voice of St. Louis, (Inc.) (St. Louis, Mo.) | | 1500—280.2 |
| KMTR | Los Angeles, Calif., K. M. Turner Radio Corp. (Oliver S. Garretson) | | 500—238 |
| KNRC | Los Angeles, Calif., Clarence B. Juneau | | 250—208.2 |
| KNX | Los Angeles, Calif., Los Angeles Evening Express | | 1000—336.9 |
| KOA | Denver, Colo., General Electric Co. | | 5000—322.4 |
| KOAC | Corvallis, Oregon, Oregon Agricultural College | | 500—280.2 |
| KOB | State College, N. M., New Mexico College of Agriculture and Mechanic Arts | | 1000—348.6 |
| KOCH | Omaha, Neb., Omaha Central High School | | 250—258 |
| KOCW | Chickasha, Okla., Oklahoma College for Women | | 200—252 |
| KOIL | Council Bluffs, Iowa, Monarch Mfg. Co. | | 500—278 |
| KOWW | Walla Walla, Wash., Blue Mountain Radio Association (Frank A. Moore) | | 500—256 |
| KPO | San Francisco, Calif., Hale Bros. | | 1000—428.3 |
| KPPC | Pasadena, Calif., Pasadena Presbyterian Church | | 50—229 |
| KPRC | Houston, Texas, Post Dispatch | | 500—296.9 |
| KPSN | Pasadena, Calif., Pasadena Star News | | 1000—315.6 |
| KQP | Portland, Ore., H. B. Read | | 500—212.6 |


# The Belmont CHICAGO

**ADVANTAGES**

OVERLOOKING BELMONT YACHT HARBOR AND LINCOLN PARK GOLF COURSES • • •
A NEW HOTEL—700 ROOMS OPENED EARLY IN 1924 ALREADY FAMOUS FOR ITS HOSPITABLE ATMOSPHERE • • •

SPECIAL MONTHLY RATES
WRITE FOR BOOKLET

G.E. Billingsley
*Manager*

SHERIDAN ROAD AT BELMONT AVE.

# NEW VEST POCKET ADDING MACHINE

Adds—Subtracts—Multiplies—Divides

Does work of $300 machine. Guaranteed 5 years. NOT A TOY.

Made of steel and indestructible. Million dollar capacity. Fits in pocket. Will not make mistakes. So simple child can operate it. Everybody should carry one for figuring.

**FREE TRIAL** **$2.50** Total Cash

SEND NO MONEY—Just name and address. We will ship Calculator immediately. On delivery pay postman $2.50 plus few cents postage ($3.50 cash outside U.S.) If not satisfied after 10 day trial you get your money back. THOUSANDS OF SATISFIED USERS. This is lowest priced practical calculator made. "Why pay more for inferior imitations?" Order from this ad.

**AGENTS** —Write for big commission and territory proposition.

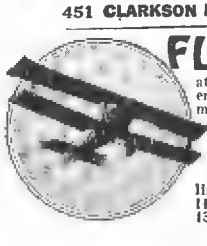
Baby Calculator Sales Co., P.O.Bx. 1118, Chicago, Ill. Dept. 22

# ANY BOOK IN PRINT

Delivered at your door. We pay the postage. Standard authors, fine editions, new books, all at biggest savings. Be sure to send postcard for Clarkson's catalog.

**FREE** Write for our great book catalog. This catalog is a short course in literature and is so used by some of America's leading universities; 800,000 book lovers buy from it. Free if you write now.

**DAVID B. CLARKSON** THE BOOK BROKER
451 CLARKSON BUILDING, CHICAGO, ILL.



**FLY** Young man, learn aviation. Build this classy plane and learn to construct and operate aircraft. Use your motorcycle engine or our "Meteor" 20 h.p. motor. We furnish parts very reasonable to build this wonderful little "Meteorplane" the World's first successful Light Plane. Send $3.50 for complete set of blue prints and parts price list of this latest Model M-T-2.

IRWIN AIRCRAFT COMPANY
130-O-Street, Sacramento, Calif.


www.americanradiohistory.com

# Captain Dingle

*America's foremost author of sea stories, tells a story of gripping mystery, intrigue, and blood-stirring action*

# The Sea Schemers

*You'll find it complete in the April*

ON All STANDS **Triple-X** OUT TODAY 25c

Thrilling Pioneer, Adventure, & Mystery Stories

## Old Color Blind

*all the romance of railroading*

By ARTHUR GUY EMPEY

## The Line Goes West

*the clash of mighty men on an old frontier*

By LOUIS E. LEGNER

15 *other big stories and features*

FAWCETT PUBLICATIONS, Inc., Robbinsdale, Minn.

Enclosed find $1 (in check or money order) for which please enter my name as a subscriber to your special five months offer. Or enclosed find 25c for which please send me one copy of the April issue of TRIPLE-X.

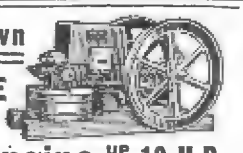
Name .....

Address .....

City ..... State ...S&I



**Only $5 Down** Buys Any WITTE Latest Model



**All-Fuel Engine up to 10 H-P.**

The One-Profit Engine. Sold Direct From Factory To You. Easy Terms on best engine built. Burns Kerosene, Distillate, Gas-Oil, Gasoline or Gas. Change power at will. Equipped with the famous WICO Magneto, speed and power regulator and throttling governor. 2 to 25 horsepower — ALL STYLES.

**FREE** Write today for my Big Engine Book. Sent free — no obligation on your part. Or, if interested, ask for our Log and Tree Saw, 3-in-1 Saw Rig or Pump Catalogs.

WITTE ENGINE WORKS
3757 Witte Building, KANSAS CITY, MO.
3757 Empire Building, PITTSBURGH, PA.



**GET ONE OF THESE NOW**

HERE is a hand ejector that has them all beat. Not to be compared with other guns at this price. Best obtainable and guaranteed to fire accurately. Shoots standard ammunition. Solid frame swing out cylinder. Best blue steel. New 1926 models. Order now. 32.20 or 38 cal. Only $9.65. Satisfaction guaranteed or money refunded. Pay on Delivery plus Postage. SEND NO MONEY.

ONLY $9.65 32 20 or 38 cal.

UNIVERSAL SALES CO.,
259 Broadway Dept. 87 New York, N. Y.

$300.00 to $500.00 Monthly IN THE REAL ESTATE Business

Get into the BIG MONEY class. No business, trade or profession offers such big returns.

Make $3,000.00 to $10,000.00 Yearly We teach you the REAL ESTATE, INSURANCE and GENERAL BROKERAGE business thoroughly by mail, furnish you big list saleable properties, help you start in business and appoint you member of our CHAIN of REAL ESTATE EXPERTS in your locality. Write today for FREE booklet and full information.

DAWSON REAL ESTATE CO., Inc., Robert Dawson, Pres. Suite 307, Merchants Nat'l Bank Bldg., Fort Smith, Arkansas


| Call Letters | Location and Name | Power & Wave Length |
|---|---|---|
| KQV | Pittsburgh, Pa., Doubleday-Hill Electric Co. | 500—275 |
| KQW | San Jose, Calif., First Baptist Church | 500—231 |
| KRE | Berkeley, Calif., Berkeley Daily Gazette | 100—256 |
| KSAC | Manhattan, Kans., Kansas State Agricultural College | 500—340.7 |
| KSD | St. Louis, Mo., Post Dispatch | 500—545.1 |
| KSL | Salt Lake City, Utah, Radio Service Corp. of Utah | 1000—299.8 |
| KSO | Clarinda, Iowa, A. A. Berry Seed Co. | 500—242 |
| KTAB | Oakland, Calif., Tenth Avenue Baptist Church | 1000—240 |
| KTBI | Los Angeles, Calif., Bible Inst. of Los Angeles | 750—293.9 |
| KTBR | Portland, Ore., Brown's Radio Shop | 50—263 |
| KTCL | Seattle, Wash., American Radio Telephone Co. | 1000—305.9 |
| KTHS | Hot Springs, Ark., New Arlington Hotel Co. | 500—374.8 |
| KTNT | Muscatine, Iowa, Norman Baker | 500—256 |
| KTW | Seattle, Wash., First Presbyterian Church | 1000—454.3 |
| KUO | San Francisco, Calif., Examiner Printing Co. | 150—250 |
| KUOM | Missoula, Mont., University of Montana | 250—244 |
| KUSD | Vermillion, S. D., University of South Dakota | 100—278 |
| KUT | Austin, Texas, University of Texas | 500—231 |
| KVOO | Bristow, Okla., Voice of Oklahoma | 500—374.8 |
| KWCR | Cedar Rapids, Iowa (H. F. Paar) | 500—278 |
| KWG | Stockton, Calif., Portable Wireless Telephone Co. | 50—248 |
| KWKC | Kansas City, Mo., Wilson Duncan Studios | 100—236 |
| KWKH | Kennonwood, La., W. G. Patterson | 500—261 |
| KWSC | Pullman, Wash., State College of Washington | 500—348.6 |
| KWWG | Brownsville, Texas, City of Brownsville, Board of City Development | 500—278 |
| KYW | Chicago, Ill., Westinghouse Electric & Mfg. Co. | 3500—535.4 |
| KZIB | Manila, P. I., I. Beck (Inc.) | 20—249.9 |
| KZKZ | Manila, P. I., Electrical Supply Co. | 100—270 |
| KZM | Oakland, Calif., Preston D. Allen | 100—240 |
| KZRQ | Manila, P. I., Manila Hotel, Far Eastern Radio (Inc.) | 500—222 |
| KZUY | Baguio, P. I., F. Johnson Elser | 500—360 |
| NAA | Arlington, Va., United States Navy Department | 1000—434.5 |
| WAAD | Cincinnati, Ohio, Ohio Mechanics Institute | 25—258 |
| WAAF | Chicago, Ill., Chicago Daily Drovers Journal | 200—278 |
| WAAW | Omaha, Neb., Omaha Grain Exchange | 500—278 |
| WABB | Harrisburg, Pa., Harrisburg Radio Co. | 10—204 |
| WABC | Asheville, N. C., Asheville Battery Co. | 20—254 |
| WABI | Bangor, Me., First Universalist Church | 100—240 |
| WABO | Rochester, N. Y., Lake Avenue Baptist Church | 100—278 |
| WABQ | Haverford, Pa., Haverford College Radio Club | 100—261 |
| WABR | Toledo, Ohio, Scott High School | 50—263 |
| WABW | Wooster, Ohio, College of Wooster | 50—206.8 |
| WABX | Mount Clemens, Mich. (near), Henry B. Joy | 500—246 |
| WABY | Philadelphia, Pa., John Magaldi, Jr. | 50—242 |
| WABZ | New Orleans, La., Coliseum Place Baptist Church | 50—275 |
| WADC | Akron, Ohio, Allen Theatre | 500—258 |
| WAFD | Port Huron, Mich., Albert B. Parfet Co. | 500—275 |
| WAGM | Royal Oak, Mich., Robert L. Miller | 50—225.4 |
| WAHG | Richmond Hill, N. Y., A. H. Grebe & Co. | 500—315.6 |
| WAIT | Taunton, Mass., A. H. Wait & Co. | 10—229 |
| WAIU | Columbus, Ohio, American Insurance Union | 500—293.9 |
| WAMD | Minneapolis, Minn., Hubbard & Co. | 500—244 |
| WAPI | Auburn, Ala., Alabama Polytechnic Inst. | 500—248 |
| WARC | Medford Hillside, Mass., American Radio & Research Corp. | 100—261 |
| WATT | Boston, Mass. (portable) Edison Electric Illuminating Co. of Boston | 100—243.8 |
| WBAA | West Lafayette, Ind., Purdue University | 250—273 |
| WBAK | Harrisburg, Pa., Pa. State Police | 500—275 |
| WBAL | Baltimore Md., Consolidated Gas, Electric Light & Power Co. | 5000—245.8 |

(*Continued on page* 1156)

# His Salary Was Raised

## while others were reduced

**"Up to the time I enrolled for a course with the International Correspondence Schools, I had only a grade-school education. Since enrolling, I have advanced to a much better position, where my salary is nearly four times as much as I was making previously. I would not be able to hold my present position had I not taken your Course. Recently I received a nice increase in salary, while other men were being reduced."**

Read that last sentence again—"Recently I received a nice increase in salary, while other men were being reduced."

There could be no better proof of the value of an I. C. S. course than that. It shows that the trained man is given preference over all others and paid more money, even in slack times, if his work deserves it. It shows that there are always bigger, better jobs open for men who have the foresight to prepare for them in spare time.

Why don't you study and get ready *too? We'll* be glad to help you if you will only make the start.

Choose the work you like best in the coupon below; then mark and mail it to the I. C. S. today. This doesn't obligate you in the least, but it will bring you information that will start you on a successful career. This is your opportunity.

***Mail the Coupon for Free Booklet***

INTERNATIONAL CORRESPONDENCE SCHOOLS
Box 6238-D, Scranton, Penna.

*Oldest and largest correspondence schools in the world*

Without cost, please tell me how I can qualify for the position or in the subject *before* which I have marked an X:

**BUSINESS TRAINING COURSES**

- ☐ Business Management
- ☐ Industrial Management
- ☐ Personnel Organization
- ☐ Traffic Management
- ☐ Business Law
- ☐ Banking and Banking Law
- ☐ Accountancy (including C.P.A.)
- ☐ Nicholson Cost Accounting
- ☐ Bookkeeping
- ☐ Private Secretary
- ☐ Spanish ☐ French
- ☐ Salesmanship
- ☐ Advertising
- ☐ Better Letters
- ☐ Show Card Lettering
- ☐ Stenography and Typing
- ☐ Business English
- ☐ Civil Service
- ☐ Railway Mail Clerk
- ☐ Common School Subjects
- ☐ High School Subjects
- ☐ Illustrating

**TECHNICAL AND INDUSTRIAL COURSES**

- ☐ Electrical Engineering
- ☐ Electric Lighting
- ☐ Mechanical Engineer
- ☐ Mechanical Draftsman
- ☐ Machine Shop Practice
- ☐ Railroad Positions
- ☐ Gas Engine Operating
- ☐ Civil Engineer
- ☐ Surveying and Mapping
- ☐ Metallurgy ☐ Mining
- ☐ Steam Engineering ☐ Radio
- ☐ Architect
- ☐ Architects' Blueprints
- ☐ Contractor and Builder
- ☐ Architectural Draftsman
- ☐ Concrete Builder
- ☐ Structural Engineer
- ☐ Chemistry ☐ Pharmacy
- ☐ Automobile Work
- ☐ Airplane Engines
- ☐ Agriculture and Poultry
- ☐ Mathematics

Name.....

Street Address..... 6-26-25

City..... State.....

Occupation.....

*If you reside in Canada, send this coupon to the International Correspondence Schools Canadian Limited, Montreal*



Coil Spring **Moth Ball Holder**

A HANDY SPIRAL CONTAINER

with removable cover. This simple device can be hung on clothes hangers or behind the door-jambs, where its action is very effective in making the whole closet moth-proof. A box of moth balls will fill eight (8) holders. Price $1.50 per dozen Discount to agents in gross lots.

R. J. LEWERS
1888 Cedar Ave. New York City

Wonderful, new device, guides your hand; corrects your writing in few days. Big improvement in three hours. No failures. Complete outline FREE. Write C. J. Ozment, Dept. 44 St. Louis, Mo.


Insure your copy reaching you each month. Subscribe to SCIENCE & INVENTION, $2.50 a year. Experimenter Publishing Co., 53 Park Pl., N.Y.C.

www.americanradiohistory.com

# Pictures that pay

YOUR mind registers hundreds of pictures every day. Faces on the street, people in a doorway, a tray of watches in a window, ribbon on a hat. Interesting or amusing, maybe . . . but of what actual value are most of them to you?

Yet a vast number of pictures than can affect your daily living are waiting for your glance. Advertisements show you better things to ride in, eat, wear, enjoy—honestly pictured for you. Pictures that pay! Such pictures make you familiar with the newest, most improved things you can buy. The soap, hosiery, fountain pen that can mean most to you. Familiar with their color, way they are wrapped, name on the package. You can recognize them at once, link them at once with their advertised facts, know all about them before you buy. You don't have to test them. They have been tested for you. The watch widely advertised ticks in thousands of pockets. The skillet on the printed page is used on a thousand stoves. Pictures in advertisements are pictures of good things enjoyed in countless homes.

*Look at advertisements and their pictures*
*They let you choose the best*



## Hotel Times Square

**255 West 43rd Street—Just West of Broadway**
**NEW YORK CITY**
*"Around the Corner from Everything"*

This magnificent hotel located within a few steps of all the leading theatres, shops and transit lines, offers accommodations at the following rates:

Rooms with Running Water.....$2.00
Rooms with Connecting Bath.....$2.50
Rooms with Private Bath.....$3.00
*No Higher Rates*

Double Rooms with Running Water $3.00 (2 Persons)
Double Rooms with Private Bath..$4.00 (2 Persons)
*Excellent Service*



Insure your copy reaching you each month. Subscribe to Radio News—$2.50 a year. Experimenter Publishing Co., 53 Park Place, New York City.


| Call Letters | Name | Location | Power & Wave Length |
|---|---|---|---|
| WBAO | Decatur, Ill., James Millikin University | | 100—270 |
| WBAP | Fort Worth, Texas, Wortham-Carter Publishing Co. (Star-Telegram) | | 1500—475.9 |
| WBAX | Wilkes-Barre, Pa., John H. Stenger, Jr. | | 100—256 |
| WBBL | Richmond, Va., Grace Covenant Church | | 100—229 |
| WBBM | Chicago, Ill., Atlas Investment Co. | | 1500—226 |
| WBBP | Petoskey, Mich., Petoskey High School | | 200—238 |
| WBBR | Rossville, N. Y., Peoples Pulpit Assn. | | 500—273 |
| WBBS | New Orleans, La., First Baptist Church | | 50—252 |
| WBBW | Norfolk, Va., Ruffner Junior High School | | 50—222 |
| WBBY | Charleston, S. C., Washington Light Infantry | | 10—268 |
| WBBZ | Chicago, Ill. (Portable), C. L. Carrell | | 50—215.7 |
| WBCN | Chicago, Ill., Foster & McDonnell | | 500—266 |
| WBDC | Grand Rapids, Mich., Baxter Laundry Co. | | 500—256 |
| WBES | Tacoma Park, Md., Bliss Electrical School | | 100—222 |
| WBNY | New York, N. Y., Shirley Katz | | 500—209.7 |
| WBOQ | Richmond Hill, N. Y., A. H. Grebe & Co. | | 100—236 |
| WBPI | Newark, N. J., I. R. Nelson Co. | | 500—263 |
| WBRC | Birmingham, Ala., Bell Radio Corporation | | 50—248 |
| WBRE | Wilkes Barre, Pa., Baltimore Radio Exchange | | 100—231 |
| WBT | Charlotte, N. C., Charlotte Chamber of Commerce | | 250—275 |
| WBZ | Springfield, Mass., Westinghouse Electric & Mfg. Co. | | 2000—331.1 |
| WBZA | Boston, Mass., Westinghouse Elec. & Mfg. Co. | | 250—242 |
| WCAC | Mansfield, Conn., Connecticut Agricultural College | | 500—275 |
| WCAD | Canton, N. Y., St. Lawrence University | | 250—263 |
| WCAE | Pittsburgh, Pa., Kaufmann & Baer Co. | | 500—461.3 |
| WCAJ | University Place, Neb., Nebraska Wesleyan University | | 500—254 |
| WCAL | Northfield, Minn., St. Olaf College | | 500—336.9 |
| WCAO | Baltimore, Md., Albert A. and A. Stanley Brager | | 100—275 |
| WCAP | Washington, D. C., Chesapeake & Potomac Telephone Co. | | 500—468.5 |
| WCAR | San Antonio, Texas, Southern Radio Corporation of Texas | | 500—263 |
| WCAT | Rapid City, S. D., South Dakota State School of Mines | | 50—240 |
| WCAU | Philadelphia, Pa., Universal Broadcasting Co. (Durham & Co.) | | 500—278 |
| WCAX | Burlington, Vt., University of Vermont | | 100—250 |
| WCBA | Allentown, Pa., Queen City Radio Station | | 15—254 |
| WCBD | Zion, Ill., Wilbur G. Voliva | | 5000—344.6 |
| WCBE | New Orleans, La., Uhalt Brothers Radio Co. | | 5—263 |
| WCBH | Oxford, Miss., University of Mississippi | | 50—242 |
| WCBM | Baltimore, Md., Hotel Chateau | | 50—229 |
| WCBQ | Nashville, Tenn., First Baptist Church | | 100—236 |
| WCBR | Providence, R. I. (portable), Charles H. Messter | | 30—205.4 |
| WCCO | Minneapolis, Minn., Washburn-Crosby Co. | | 5000—416.4 |
| WCEE | Elgin, Ill., Liberty Weekly | | 1000—275 |
| WCLO | Camp Lake, Wis., C. E. Whitmore | | 50—231 |
| WCLS | Joliet, Ill., H. M. Couch | | 150—214.2 |
| WCSH | Portland, Me., Congress Square Hotel Co. | | 500—256 |
| WCSO | Springfield, Ohio, Wittenberg College | | 100—248 |
| WCWS | Providence, R. I., United States (Portable) Chas. W. Selen. | | 100—209.7 |
| WCX | Pontiac, Mich., Detroit Free Press | | 5000—516.9 |
| WDAD | Nashville, Tenn., Dad's Auto Accessories (Inc.) | | 150—226 |
| WDAE | Tampa, Fla., Tampa Daily Times | | 250—273 |
| WDAF | Kansas City, Mo., Kansas City Star | | 500—365.6 |
| WDAG | Amarilla, Texas, J. Laurance Martin | | 100—263 |
| WDAH | El Paso, Texas, Trinity Methodist Church (South) | | 50—267.7 |
| WDAY | Fargo, N. D., Radio Equipment Corporation | | 50—261 |
| WDBC | Lancaster, Pa., Kirk, Johnson & Co. | | 50—258 |
| WDBE | Atlanta, Ga., Gilham-Schoen Electric Co. | | 100—270 |
| WDBJ | Roanoke, Va., Richardson-Wayland Electrical Corporation | | 50—229 |

www.americanradiohistory.com

## I'LL TRAIN YOU IN 20 WEEKS

FOR A BIG-PAY JOB IN

## ELECTRICITY

I guarantee under bond to qualify you for a $3,000 a year electrical job or refund your money. No matter what your education or previous experience you now can master this amazing new training under my personal supervision. Electricity needs trained men. Be one of the high paid electrical experts.

### TRAIN AT HOME

The amazing new, Shop Type system of the S & H Engineering Co., (affiliated with Lincoln Institute of Technology) fits you quick for big jobs. Prepares you for your own big, prosperous business. Hundreds have left low pay jobs and become electrical experts by this simple, easy method.

### SEND FOR FREE BOOK

You, too can easily qualify through this amazing training by study at home. This training is copyrighted — nothing like it anywhere. Write today for big FREE book. Shows you what hundreds no better fitted than you have done. Do not delay. Write me personally. M. J. Brown, Chief Engineer, S & H Engineering Co., Dept. D-2, 1422 W. Monroe St., Chicago.

## Make Money Taking Pictures!

Women delighted with new dignified pleasant way to make $50 and more a week

We train you quickly at home. No experience necessary. Spare time or full time. Professional camera free. Photographs in big demand by magazines, newspapers, advertisers, etc. Also train you to take better portraits than the average professional photographer! Equip you to make $50 to $100 a week in business of your own. New plan. Nothing else like it. Write today for amazing details.

**International Studios, Inc.**
Dept. 1424 3601 Michigan Ave., Chicago, Ill.

## LEARN DRAFTING
AT HOME IN SPARE TIME

Become an expert Draftsman—earn $50 to $200 per week. Learn Mechanical, Machine, Architectural or Structural Drafting at home in spare time. Personal instruction. Easy monthly payments. We furnish complete set of drawing instruments. Free Book explains all—write for it.
THE PRACTICAL MECHANIC
Dept. 105, South Haven, Mich.

## Start a Movie Show

SMALL CAPITAL STARTS YOU
Big opportunity to become independent. No experience needed. We show you how. Our easy payment plan makes it easy to start. We equip you complete. Our machines used and endorsed by government institutions. Write today for free catalog.
ATLAS MOVING PICTURE CO.
536 S. Dearborn St. Dept. R0, Chicago

## Fair Write

Begin Today—Write for My FREE BOOK. I can make a good penman of you at home during spare time. Write for my FREE BOOK, "How To Become a Good Penman," it contains specimens and tells how others mastered penmanship by the Tamblyn System. Your name will be elegantly written on a card if you enclose stamp to pay postage. Write today for book.
F. W. TAMBLYN, 724 Ridge Bldg. Kansas City, U.S.A.

## Learn Advertising at HOME

Some of the highest paid men in the world are advertising men. You can learn easily and quickly at home during your spare time. Bigger opportunities now in advertising than ever before. Constant demand for our graduates at big pay. Send for FREE Book. Giving interesting information and vital facts—just what you want to know about advertising. Write today! PAGE-DAVIS SCHOOL OF ADVERTISING
Dept. 1423 3601 Michigan Ave., Chicago, U. S. A.


| Call Letters | Name | Location | Power & Wave Length |
|---|---|---|---|
| WDBK | Cleveland, Ohio, M. F. Broz Furniture, Hardware & Radio Store | | 100—227 |
| WDBO | Winter Park, Fla., Rollins College | | 500—240 |
| WDBZ | Kingston, N. Y., Boy Scouts of America | | 10—233 |
| WDOD | Chattanooga, Tenn., Chattanooga Radio Co. | | 500—256 |
| WDRC | New Haven, Conn., Doolittle Radio Corp. | | 100—268 |
| WDWF | Cranston, R. I., Dutee W. Flint, Lincoln Studios, Inc. | | 500—440.9 |
| WDZ | Tuscola, Ill., James L. Bush | | 10—278 |
| WEAF | New York, N. Y., American Tel. & Tel. Co. | | 5000—491.5 |
| WEAI | Ithaca, N. Y., Cornell University | | 500—254 |
| WEAM | North Plainfield, N. J., Borough of North Plainfield | | 250—261 |
| WEAN | Providence, R. I., Shepard Co. | | 500—270 |
| WEAO | Columbus, Ohio, Ohio State University | | 500—293.9 |
| WEAR | Cleveland, Ohio, Goodyear Tire & Rubber Co. | | 750—389.4 |
| WEAU | Sioux City, Iowa, Davidson Bros. Co. | | 100—275 |
| WEBC | Superior, Wis., Walter C. Bridges | | 100—242 |
| WEBD | Anderson, Ind., Electrical Equipment & Service Co. | | 15—246 |
| WEBE | Cambridge, Ohio, Roy W. Waller | | 10—234 |
| WEBH | Chicago, Ill., Edgewater Beach Hotel Co. | | 1500—370.2 |
| WEBJ | New York, N. Y., Third Avenue Ry. Co. | | 500—273 |
| WEBL | New York, N. Y., Woolworth Bldg., United States (portable), R. C. A. | | 100—226 |
| WEBM | New York, N. Y., United States (Portable) Wool-Worth Building | | 100—226 |
| WEBQ | Harrisburg, Ill., Joseph R. Tate | | 10—226 |
| WEBR | Buffalo, N. Y., H. H. Howell | | 100—244 |
| WEBW | Beloit, Wis., Beloit College | | 500—268 |
| WEBZ | Savannah, Ga., Savannah Radio Corp. | | 50—263 |
| WEEI | Boston, Mass., Edison Electric Illuminating Co. of Boston | | 500—348.6 |
| WEHS | Evanston, Ill., Robert E. Hughes | | 10—202.6 |
| WEMC | Berrien Springs, Mich., Emmanuel Missionary College | | 500—285.5 |
| WENR | Chicago, Ill., All American Radio Corp. | | 1000—266 |
| WEW | St. Louis, Mo., St. Louis University | | 1000—248 |
| WFAA | Dallas, Tex., Dallas News & Dallas Journal | | 500—475.9 |
| WFAM | St. Cloud, Minn., Times Publishing Co. | | 10—273 |
| WFAV | Lincoln, Nebr., University of Nebraska | | 500—275 |
| WFBC | Knoxville, Tenn., First Baptist Church | | 50—250 |
| WFBD | Philadelphia, Pa., Gethsemane Baptist Church | | 5—234 |
| WFBE | Seymour, Ind., Van de Walle Music and Radio Co. | | 10—226 |
| WFBG | Altoona, Pa., William F. Gable Co. | | 100—278 |
| WFBH | New York, N. Y., Hotel Majestic (Concourse Radio Corp.) | | 500—273 |
| WFBI | Camden, N. J., Galvin Radio Supply Co. | | 250—236 |
| WFBJ | Collegeville, Minn., St. John's University | | 100—236 |
| WFBL | Syracuse, N. Y., Onondaga Hotel Co. | | 100—252 |
| WFBM | Indianapolis, Ind., Merchants Heat & Light Co. | | 250—268 |
| WFBR | Baltimore, Md., Fifth Infantry, Maryland N. G. | | 100—254 |
| WFBZ | Galesburg, Ill., Knox College | | 20—254 |
| WFDF | Flint, Mich., Frank D. Fallian (Police Building) | | 100—234 |
| WFI | Philadelphia, Pa., Strawbridge & Clothier | | 500—394.5 |
| WFKB | Chicago, Ill., Francis K. Bridgman | | 500—217.3 |
| WFRL | Brooklyn, N. Y., Robert M. Lacey and James A. Bergner (Flatbush Radio Laboratories) | | 100—205.4 |
| WGAL | Lancaster, Pa., Lancaster Electric Supply & Construction Co. | | 10—248 |
| WGBB | Freeport, N. Y., Harry H. Carman | | 100—244 |
| WGBC | Memphis, Tenn., First Baptist Church | | 10—278 |
| WGBF | Evansville, Ind., Finke Furniture Co. | | 500—236 |
| WGBI | Scranton, Pa., Frank S. Megargee | | 10—240 |

(*Continued on page* 1159)

Corner of One of the Seven S. of E. Laboratories

# Take This Short Cut to Accomplish Your Ambition

The field of electrical engineering offers wonderful opportunities for trained men to direct and carry out great industrial and commercial projects. Get a thorough and practical training here in our course of

### ELECTRICAL ENGINEERING with B. S. Degree In 3 Years

A faculty of specialists is leading hundreds of ambitious young men to sure success. Why not you?
If you are lacking some preparatory studies you can make them up here. This is an exceptional opportunity to become an electrical engineer in the shortest possible time

### JUNIOR ELECTRICAL ENGINEERING

From 1 to 2 years in this course makes you a completely trained Junior Electrical Engineer—prepared to fill such positions as general plant superintendent, director of construction, superintendent of maintenance, chief draftsman, etc. The Junior Electrical Engineer is the man between the Electrical Engineer and the Electrician—a well paid position and a stepping stone to higher executive work. A grade school diploma or equivalent admits you without examination. New term opens every 6 weeks.

### COMMERCIAL ELECTRICAL ENGINEERING in 1 Year

Unparalleled opportunities for brilliant, successful careers in the new field of Commercial Electrical Engineering. To meet the extraordinary present-day demands for trained electrical business men, consulting and efficiency engineers, we offer this thorough, condensed and very practical training, especially adapted to high school graduates.

### PRACTICAL ELECTRICITY

In this complete 6 months' Electrical Course—8 hours daily—you can learn house, factory and theatre wiring, testing and meter work, A.C. and D.C. Armature Winding and all necessary mathematics.
A 3 months' course in A.C. and D.C. Armature Winding, or a 3 months' Course in Light and Motor Wiring and Testing is offered to those with limited time and means.

### AUTOMOTIVE ELECTRICITY

Electrical specialists who instinctively diagnose and locate automotive electrical troubles command high positions and are well paid. Specialize in starting, lighting, ignition and storage batteries and command a big job at a big salary.

### "EARN WHILE YOU LEARN"

We agree to provide for a limited number of worthy young men, half-time jobs at good wages, and permanent positions with unlimited prospects to all duly qualified graduates. **Here is the opportunity of your life to acquire a thorough, practical training for big-paying profession that is in urgent need for trained men**

### ESTABLISHED 21 YEARS AGO

The S of E. stands absolutely alone in the field of thorough, practical electrical education and in commercial and electrical engineering.

### NO NEED OF YOUR BEING WITHOUT AN S. OF E. TRAINING

It does not matter how old you are or what schooling you have had. Students from 16 years up to 50 are in attendance here

**Fill out the following coupon and mail it to-day.**

## SCHOOL of ENGINEERING of Milwaukee

Founded 1905

SCHOOL OF ENGINEERING OF MILWAUKEE
SI-326A, 415-417 Marshall Street, Milwaukee, Wis.

Without obligating me in any way, please mail free 72-page illustrated book, "Electricity and the One Best Way to Learn It," and particulars regarding the course I have marked with an X

....Electrical Engineering.
....Electrotechnics.
....Commercial Electrical Engineering.
....Junior Electrical Engineering.
....Automotive Electricity.
....Armature Winding.
....Light, Motor Wiring and Testing.
....Practical Electricity.
....I am interested in your "Earn While You Learn" Plan

Name ..... Age .....
Address .....
City ..... State .....
Education .....


www.americanradiohistory.com

# These Twenty Regular Monthly Features Make RADIO NEWS the Greatest and Most Complete Radio Publication in the World. It Has Nearly Three Times the Circulation of Any Other Monthly Radio Magazine

RADIO NEWS

Everywhere in radio we find opportunities for development and improvement. 1926 will surely bring forth many novel devices for the standardizing and improvement of radio transmitting and receiving and perhaps many new devices for enlarging and broadening the sphere of radio to the people of the world.

RADIO NEWS is the medium that keeps thousands and thousands of radio fans in direct touch with what is going on every where in the industry. It is radio's greatest magazine written for every one who owns or uses a radio set whether he be a broadcast listener or professional radio engineer.

By subscribing to RADIO NEWS and using the coupon below a copy of RADIO NEWS will be mailed direct to your home for twelve months and you can save 50c over what you would have to pay if you bought your copy each month on the newsstand.

Fill out and mail this coupon today. Remember you can save 50c and have RADIO NEWS delivered to your home each month for twelve months, do not delay.

**Published by**

**Experimenter Publishing Co., Inc.**
**53 Park Place New York, N. Y.**

Experimenter Pub. Co., Inc.,
53 Park Place, New York, N. Y.

Gentlemen:—Enclosed find $2.50 for One Year's (12 months') Subscription to RADIO NEWS.

Name .....

Address .....

City, State .....

## 1—EDITORIAL PAGE

Mr. Hugo Gernsback who writes the editorial of RADIO NEWS has been spoken of as a man who is responsible for more technical developments of radio apparatus than any other single individual in the industry. Each month he writes one of his interesting articles on radio's past, present or future.

## 2—CONTESTS

Every month RADIO NEWS offers hundreds of dollars in prize contests which are open to all readers. In a recent $300 "What's Wrong" contest over ninety-seven hundred replies were received.

## 3—UNIVERSAL INTEREST ARTICLES

This is a most interesting department for set owners and users governing general subjects which have to do with broadcast reception and the various uses of radio receivers in the home.

## 4—RADIOTICS

This is the humor section of RADIO NEWS. It contains some very unusual jokes pertaining to radio and makes very interesting light reading.

## 5—RECENT RADIO PHOTOS

This department keeps you in a picture way in touch with the very latest inventions in radio.

## 6—ARTISTS OF THE MICROPHONE

Every month this department of RADIO NEWS gives the reader a group of the people who entertain during the month from our prominent broadcast stations.

## 7—U. S. BROADCAST STATION LIST

This regular monthly feature contains an absolutely active and up-to-date list of every broadcast station in the United States, together with wave length and power.

## 8—RADIO SET DIRECTORY

Annually, in RADIO NEWS, is published a free service for radio readers. It is a directory giving complete information as to size and type of all radio sets manufactured in the United States.

## 9—TECHNICAL INFORMATION

To those readers of RADIO NEWS who are more advanced in radio this department offers plenty of technical information on the new developments in radio transmitters and receiving apparatus.

## 10—CONSTRUCTIONAL ARTICLES

The construction of radio sets will never cease to be an interesting hobby to those who "build their own" sets, RADIO NEWS offers many pages of constructional articles for them.

## 11—STANDARD HOOK-UPS

Every month RADIO NEWS offers many practical standard hook-ups for the set builders. This is always a live section for many radio fans.

## 12—WITH THE AMATEUR

RADIO NEWS has not overlooked the amateur radio fan. This is a big section for the active group of radio readers.

## 13—RADIO NEWS LABORATORIES

Established in 1922 the RADIO NEWS Laboratories have maintained a wonderful reputation for the testing of radio parts. Their seal of approval is the guarantee of value.

## 14—"I WANT TO KNOW"

This is the RADIO NEWS question and answer department. Where you can submit your problems to our radio engineers for solution each month. There appears answers to questions asked by many people.

## 15—INTERNATIONAL RADIO

This department keeps you in touch with what is going on in radio outside of the United States. It is one of RADIO NEWS's most interesting departments.

## 16 SCIENTIFIC ARTICLES

The march of radio develops many events which are of interest to the general public. These are covered in a special department of RADIO NEWS.

## 17—RADIO MANUFACTURING

The production and marketing of the radio receivers or parts you use are shown in this section of RADIO NEWS. It is always an interesting corner for our readers.

## 18—CORRESPONDENCE FROM READERS

In this department you can know what is going on from day-to-day of various readers. It keeps you in touch with the ideas of the day.

## 19—RADIO BEGINNER

This is one of the most valuable departments of RADIO NEWS for the average listener. In itself it makes every copy worth while to the reader.

## 20—SET OWNERS INFORMATION

This is for everyone, containing the opinions and advice of the best Radio Experts—Don't miss it.

www.americanradiohistory.com

# A new Parks!

**Cabinet Shop Special**
**No. 10**
**$290**
**AS ILLUSTRATED WITH MOTOR**

**You ought to have this handy Parks in your shop**

A compact, complete machine designed just like a big production outfit at one-fifth the cost. Nothing extra to buy. Motors included, operating from any light socket. Fits in a corner of your basement. Does any kind of cabinet and joinery work. Circular saw, joiner and bandsaw on permanent all-steel frame. Add lathe, shaper and other attachments at small cost. You can make money with this Parks! Write for circular.

**The Parks Ball Bearing Machine Co.**
**1553 Knowlton St., Cincinnati, Ohio**
**Canadian Fac: 200 Notre Dame East, Montreal, Can.**

**PARKS**
**WOODWORKING MACHINES**

# Stop Using a Truss

Reduced Fac-Simile Gold Medal

**STUART'S PLAPAO-PADS** are different from the truss, being mechanico-chemico applicators made self-adhesive purposely to hold the distended muscles securely in place. No straps, buckles or spring attached—cannot slip, so cannot chafe or press against the pubic bone. Thousands have successfully treated themselves at home without hindrance from work—most obstinate cases conquered.

Reduced Fac-Simile Grand Prix

Soft as velvet—easy to apply—inexpensive. Awarded Gold Medal and Grand Prix. Process of recovery is natural, so afterwards no further use for trusses. We prove it by sending Trial of Plapao absolutely **FREE**. Write name on Coupon and send TODAY.

**Plapao Co., 924 Stuart Bldg., St. Louis Mo.**

Name .....

Address .....

Return mail will bring Free Trial Plapao

**MECHANICAL INVESTIGATIONS OF LEONARDO DA VINCI**

by Ivor B. Hart, University of London. "The main outlines of Leonardo's work in dynamics and statics are given with a clarity and an understanding that make the book a valuable introduction to these important branches of Leonard's scientific studies . . ."—The London Times. Price $4.00

**PATENTS, INVENTION AND METHOD**
**By H. D. Potts**

A guide to the general lines of procedure in invention and discovery. Price $1.00

Send for Complete Catalog of Publications

**THE OPEN COURT PUBLISHING COMP'Y**
**122 South Michigan Avenue, Chicago, Ill.**

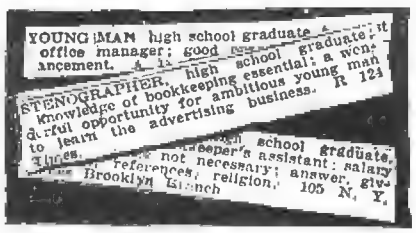
# A Cinch to Make $25 a Week — In Spare Time

Amazing new home-study method makes it easy to learn to make big-paying clever show cards. Great demand. No talent needed. Write for Special offer and illustrated Free book to Washington Show Card School. Room 264-D, 1115-15th St. N. W., Washington, D. C.


(*Continued from page* 1157)

| Call Letters | Name | Location | Power & Wave Length |
|---|---|---|---|
| WGBM | Providence, R. I., Theodore N. Saaty | | 30—234 |
| WGBR | Marshfield, Wis., George S. Ives | | 10—229 |
| WGBS | New York, N. Y., Gimbel Brothers | | 500—315.6 |
| WGBU | Fulford-by-the-Sea, Fla., Florida Cities Finance Co. | | 500—278 |
| WGBX | Orono, Me., University of Maine | | 100—252 |
| WGCP | Newark, N. J., D. W. May, Inc. | | 500—252 |
| WGES | Oak Park, Ill., Oak Leaves Broadcasting Station (Coyne Elec. School) | | 500—250 |
| WGHB | Clearwater, Fla., The George H. Bowles Developments | | 500—266 |
| WGHP | Detroit, Mich., George H. Phelps | | 1500—270 |
| WGMU | Richmond Hill, N. Y. (portable) A. H. Grebe & Co. | | 100—236 |
| WGN | Chicago, Ill., The Tribune (Drake Hotel) | | 1000—302.8 |
| WGR | Buffalo, N. Y., Federal Radio Corp. | | 750—319 |
| WGST | Atlanta, Ga., Georgia School of Technology | | 500—270 |
| WGY | Schenectady, N. Y., General Electric Co. | | 5000—379.5 |
| WHA | Madison, Wisconsin, University of Wisconsin | | 750—535.4 |
| WHAD | Milwaukee, Wis., Marquette University and Milwaukee Journal | | 500—275 |
| WHAM | Rochester, N. Y., University of Rochester (Eastman School of Music) | | 100—278 |
| WHAP | New York, N. Y., Wm. H. Taylor Finance Corp. | | 500—240 |
| WHAR | Atlantic City, N. J., Seaside Hotel | | 500—275 |
| WHAS | Louisville, Ky., Courier-Journal & Louisville Times | | 500—399.8 |
| WHAT | Minneapolis, Minn., George W. Young | | 500—263 |
| WHAV | Wilmington, Del., Wilmington Electrical Specialty Co. | | 100—266 |
| WHAZ | Troy, N. Y., Rensselaer Polytechnic Institute | | 1000—379.5 |
| WHB | Kansas City, Mo., Sweeney School Co. | | 500—365.6 |
| WHBA | Oil City, Pa., Shaffer Music House | | 10—250 |
| WHBC | Canton, Ohio, Rev. E. P. Graham | | 10—254 |
| WHBD | Bellefontaine, Ohio, Chas. W. Howard | | 20—222 |
| WHBF | Rock Island, Ill., Beardsley Specialty Co. | | 100—222 |
| WHBG | Harrisburg, Pa., John S. Skane | | 20—231 |
| WHBH | Culver, Ind., Culver Military Academy | | 100—222 |
| WHBJ | Fort Wayne, Ind., Lauer Auto Co. | | 50—234 |
| WHBK | Ellsworth, Me., Franklin Street Garage | | 10—231 |
| WHBL | Chicago, Ill. (portable), C. L. Carrell | | 50—215.7 |
| WHBM | Chicago, Ill., C. L. Carrell | | 20—215.7 |
| WHBN | St. Petersburg, Fla., First Ave. Methodist Church | | 10—238 |
| WHBP | Johnstown, Pa., Johnstown Automobile Co. | | 100—256 |
| WHBQ | Memphis, Tenn., Men's Fellowship Class of St. John's M. E. Church South | | 50—233 |
| WHBU | Anderson, Ind., Riviera Theatre and Bings Clothing | | 10—218.8 |
| WHBW | Philadelphia, Pa., D. R. Kienzle | | 100—215.7 |
| WHBY | West De Pere, Wis., St. Norbert's College | | 50—250 |
| WHDI | Minneapolis, Minn., William Hood Dunwoody Industrial Institute | | 500—278 |
| WHEC | Rochester, N. Y., Hickson Electric Co. | | 100—258 |
| WHK | Cleveland, Ohio, Radio Air Service Corp. (Warren R. Cox) | | 1000—272.6 |
| WHN | New York, N. Y., George Schubel | | 500—361.2 |
| WHO | Des Moines, Iowa, Bankers Life Co. | | 5000—526 |
| WHT | Deerfield, Ill., Radiophone Broadcasting Corp. | | 2500—238 |
| WIAD | Philadelphia, Pa., Howard R. Miller | | 100—250 |
| WIAS | Burlington, Iowa, Home Electric Co. | | 100—254 |
| WIBA | Madison, Wis., Capital Times Studio | | 100—236 |
| WIBC | St. Petersburg, Fla., L. M. Tate Post No. 39, Veterans of Foreign Wars | | 100—222 |
| WIBG | Elkins Park, Pa., St. Paul's Protestant Episcopal Church | | 50—222 |
| WIBH | New Bedford, Mass., Elite Radio Stores, James T. Moriarty | | 30—209.7 |

(*Continued on page* 1161)



YOUNG MAN high school graduate
office manager; good
ancement.
STENOGRAPHER, high school graduate;
knowledge of bookkeeping essential; a wonderful opportunity for ambitious young man
to learn the advertising business.
Times.
not necessary; answer, giv
Brooklyn Branch

# Why Best Jobs Demand High School Training

We all know the truth of that old adage "Knowledge is Power."

The ability to THINK has lifted man above the savages. The difference in ability to THINK lifts one man above another.

To EARN more you must be able to THINK more.

Every penny you invest in developing your BRAIN will come back to you a hundred or a thousand-fold.

## Increases Earnings 2300%

The earnings of millions of people have been checked up by the U. S. Census Bureau, and the result PROVES beyond question that High School graduates earn 23 TIMES as much as grammar school graduates! Think what a handicap you will be under all through your life without high school training!

## High School Subjects Now Taught a New Way

It is not too late for you to acquire the essentials of a High School education. A remarkable series of Question and Answer books bring the High School to your home; you learn in spare time in the most fascinating way imaginable. No dry-as-dust lessons or essays. Just the most important FACTS presented in the most successful teaching method known. Every question is right to the point—every answer is simple, direct, easily understood, interesting. A reading of these books, in the delightfully easy form of questions and answers will soon give you the equivalent of High School training—and the greater earning capacity of a High School education!

## One Dollar per Subject

These Question and Answer books, if placed in the form of a correspondence course, would cost at least $5.00 each, or $60 for the set of 12. Since no further instruction is needed, they are sold as books, at $1. Without question, this is the biggest bargain in education ever offered!

## Send No Money

Order one or all of the twelve books, listed in the coupon. Single copies one dollar each. SIX books only $5.00. The entire twelve for only $9.50. The books will be sent payable on delivery. If after examination they are not entirely satisfactory, return in 10 days for full refund.

Isn't it worth a dollar a subject to acquire the essentials of a high school education in this easy, fascinating way? Do not be handicapped any longer. Begin at once to make up what you now lack. Mail the coupon now.

HIGH SCHOOL HOME STUDY BUREAU,
Dept. 64, 31 Union Square, New York.

Please send me the Question and Answer books checked below.

| | |
|---|---|
| ☐ Biology | ☐ Literature |
| ☐ Ancient History | ☐ Economics |
| ☐ American History | ☐ French |
| ☐ Elementary Algebra | ☐ Latin |
| ☐ Physics | ☐ Spanish |
| ☐ Modern History | ☐ English Grammar |

I will give the mail man $1.00 plus delivery charges for each book ordered, (or 6 for $5.00, or 12 for $9.50). If not satisfied with the books I will return within 10 days and you are to refund my money.

Name .....

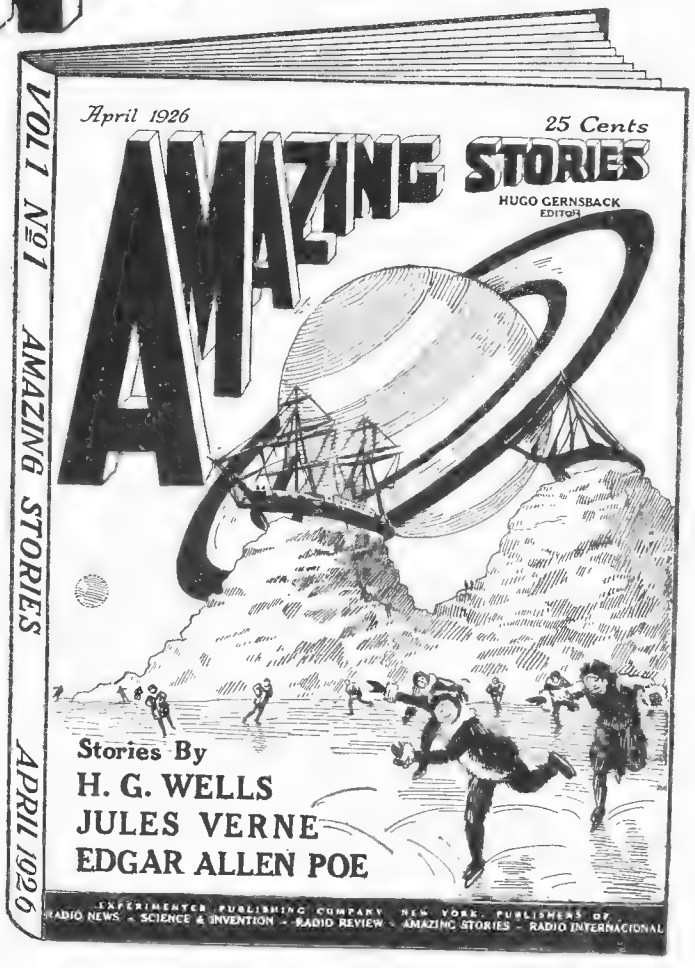
Address .....

City ..... State.....

Note: If check or money order is mailed with coupon we prepay all delivery charges. Money back if desired after examination.


www.americanradiohistory.com

# INTRODUCING AMAZING STORIES


VOL 1 No 1 AMAZING STORIES APRIL 1926
April 1926
25 Cents
AMAZING STORIES
HUGO GERNSBACK
EDITOR
Stories By
H. G. WELLS
JULES VERNE
EDGAR ALLEN POE
EXPERIMENTER PUBLISHING COMPANY NEW YORK, PUBLISHERS OF
RADIO NEWS - SCIENCE & INVENTION - RADIO REVIEW - AMAZING STORIES - RADIO INTERNACIONAL

THE NEWEST STORY MAGAZINE

**25c EVERYWHERE**

**100 PAGES ILLUSTRATED**

*Stories by*
**H. G. WELLS**
**JULES VERNE**
**EDGAR ALLEN POE**
**and other great writers**

## Big, Smashing Stories of the Future, Educational, Absorbing

You are familiar with some of the brilliant works of Jules Verne, the master of imagination, H. G. Wells, with his equally daring imagination, and other authors of the imaginative school.

Never before was there a magazine that contained stories of this type exclusively. AMAZING STORIES, published by the publishers of SCIENCE and INVENTION and RADIO NEWS, and edited by Hugo Gernsback, himself an author of imaginative stories, will bring to you from month to month the most amazing stories of the world's greatest scientific fiction.

### GREAT NEWS

**The publishers of AMAZING STORIES have contracted for the entire 15 volumes of Jules Verne stories—each and every story that Jules Verne ever wrote.** Many of these stories have never appeared in print before in America, except in one expensive library edition, while most of Jules Verne's stories have never been available to the public at large in America. **AMAZING STORIES has all of them and will publish them for several years to come.**

The publishers of the new magazine are scouring the world for stories of this type, and have already secured English, French, and German works, all of which will be published in forthcoming editions.

In the very first issue, one of the finest bits of imagination of Jules Verne, "Off on a Comet" is published. There also appears stories by H. G. Wells, Ray Cummings, Edgar Allen Poe, and others.

Interesting, startling, and amazing from cover to cover. Every story illustrated. Don't miss the first issue, buy your copy today and watch for the next issue, or you can receive your copy every month by sending $2.50. Your dealer will have single copies for sale at 25c each. The magazine being advertised widely, there will be a tremendous demand for it, so place your order today.

Amazing Stories is published every month, contains 100 big pages, illustrated, large size, 8 x 11 inches. A great big book. Do not miss it.

## READ AMAZING STORIES

**SOLD EVERYWHERE, OR IF YOUR DEALER CANNOT SUPPLY YOU WRITE DIRECT TO**

**Experimenter Publishing Co., Inc., 53 Park Pl., New York**

www.americanradiohistory.com

**Prices Reduced**
**On All Standard Make**
**TYPEWRITERS**

Lowest Prices in Years
We will ship any make you choose for one week's trial. Underwood, Royal, L. C. Smith, Remington, Oliver, etc.
**Easy Terms** Pay less than rent each month and own a typewriter. Guaranteed as good as new. Perfectly rebuilt by experts—the famous "Young Process." Send for our free trial offer and new low price list now. WRITE TODAY.

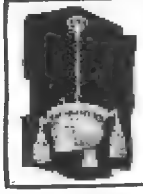
**Young Typewriter Co.**
*World's Largest Dealers in Standard Typewriters*
654 W. Randolph St., Dept. 1164, Chicago, Ill.

*READ*
**AMAZING STORIES**
*The Scientific Story Magazine*
SEE ADVERTISEMENT PAGE 1160

**A PERFECT NOSE**

Shaped at home while you sleep. Rapid, painless and safe. The ANITA is a unique and most comfortable nose adjuster absolutely guaranteed. Doctors recommend it highly. No screws. No metal. Winner of GOLD MEDAL Feb. 1923. Write for free booklet.
THE ANITA CO., Dept. 473 Anita Bldg., Newark, N.J.

**30 Days' Free Trial**
Select from 44 Styles, colors and sizes, famous Ranger bicycles. Delivered free on approval, express prepaid, at Factory Prices, from $21.50 up.
**$5 a Month** if desired. Parents often advance first deposit. Boys can earn small payments.
**Tires** wheels, lamps, horns, equipment at half usual prices. Send No Money. Write for our marvelous prices and terms.
**Mead CYCLE COMPANY** Dept. G-107 CHICAGO
Write us today for free catalog



"LIGHTING FIXTURES"
READY TO HANG
Direct from the manufacturer.
Completely wired including glassware.
Send for new Catalogue No. 27
(Just reduced prices)
*Special Proposition to Dealers*
ERIE FIXTURE SUPPLY CO.
Desk B Erie, Pa.

**Everything in Motion Pictures**
Complete short stories for small machines, 100 to 1000 ft. All leading Stars.
*Special Exchange Arrangement*
Metropolitan Motion Picture Company
108-110 W 34th St. - New York City

SEND FOR THE INTERNATIONAL CATALOG

Our net price list. Full line of auto bodies and accessories for Fords at Wholesale Prices. Save big money on bodies by buying Direct from Factory.
FOR FORD—Prices from $27.85 up. Factory to consumer direct—Pay only One Profit.
International Body Works, 914 W. Ohio St., Dept. 4, Chicago, Ill.

**Study AT Home**
**Become More Efficient**
Courses in *Mathematics, Chemistry, Psychology, Education, Business,* and 40 other subjects command either High School or College Credit. Start any time.
The University of Chicago
27 Ellis Hall CHICAGO, ILL.


(*Continued from page* 1159)

| Call Letters | Name | Location | Power & Wave Length |
|---|---|---|---|
| WIBI | Flushing, N. Y., Frederick B. Zittell, Jr. | | 50—218.8 |
| WIBJ | Chicago, Ill. (Portable), C. L. Carrell | | 50—215.7 |
| WIBM | Chicago, Ill. (portable) Billy Maine | | 10—215.7 |
| WIBO | Chicago, Ill., Nelson Bros., (Russo & Fiorito Orchestra Exchange | | 1000—226 |
| WIBR | Weirton, W. Va., Thurman A. Owings | | 50—246 |
| WIBS | Elizabeth, N. J., (portable) N. J. Nat'l. Guard, 57th Infantry Brigade | | 10—202.6 |
| WIBU | Poynette, Wis., The Electric Farm | | 20—222 |
| WIBW | Logansport, Ind., L. L. Dill.. | | 100—220 |
| WIBX | Utica, N. Y., Grid Leak (Inc.) | | 150—205.4 |
| WIBZ | Montgomery, Ala., A. D. Trum | | 10—231 |
| WIL | St. Louis, Mo., St. Louis Star & Benson Radio Co. | | 250—273 |
| WIOD | Miami Beach, Fla., Carl G. Fisher | | 1000—247.8 |
| WIP | Philadelphia, Pa., Gimbel Brothers | | 500—508.2 |
| WJAD | Waco, Texas, Frank P. Jackson | | 500—352.7 |
| WJAG | Norfolk, Nebr., Norfolk Daily News | | 200—270 |
| WJAK | Kokomo, Ind., Rev. Clifford L. White | | 50—254 |
| WJAM | Cedar Rapids, Iowa, D. M. Perham | | 100—268 |
| WJAR | Providence, R. I., The Outlet Co. (J. Samuels & Bro.) | | 500—305.9 |
| WJAS | Pittsburgh, Pa., Pittsburgh Radio Supply House | | 500—275 |
| WJAX | Jacksonville, Fla., City of Jacksonville | | 1000—336.9 |
| WJAZ | Mount Prospect, Ill., Zenith Radio Corp. | | 1500—322.4 |
| WJBA | Joliet, Ill., D. H. Lentz, Jr. | | 50—206.8 |
| WJBB | St. Petersburg, Fla., L. W. McClung | | 10—254 |
| WJBC | La Salle, Ill., Hummer Furniture Co. | | 100—234 |
| WJBG | Charlotte, N. C., Interstate Radio (Inc.) | | 10—224 |
| WJBI | Red Bank, N. J., Robert S. Johnson | | 250—218.8 |
| WJBK | Ypsilanti, Mich., Ernest F. Goodwin | | 10—233 |
| WJBL | Decatur, Ill., Wm. Gushard, Dry Goods Co. | | 500—270 |
| WJBO | New Orleans, La., Valdemar Jensen | | 100—268 |
| WJBU | Lewisburg, Pa., Bucknell University | | 100—211.1 |
| WJJD | Mooseheart, Ill., Supreme Lodge, Loyal Order of Moose | | 500—370.2 |
| WJR | Pontiac, Mich., Jewett Radio & Phonograph Co. | | 5000—516.9 |
| WJY | New York, N. Y., R. C. A. | | 1000—405.2 |
| WJZ | New York, N. Y., R. C. A. | | Variable—454.3 |
| WKAF | Milwaukee, Wis., WKAF Broadcasting Corp. | | 500—261 |
| WKAQ | San Juan, P. R., Radio Corp. of Porto Rico | | 500—340.7 |
| WKAR | East Lansing, Mich., Michigan State College | | 1000—285.5 |
| WKAV | Laconia, N. H., Laconia Radio Club (Portable) | | 50—224 |
| WKBB | Joliet, Ill., Sanders Brothers. | | 100—214.2 |
| WKBE | Webster, Mass., K & B Electric Co. | | 100—231 |
| WKBG | Chicago, Ill. (Portable), C. L. Carrell | | 100—215.7 |
| WKRC | Cincinnati, Ohio, Kodel Radio Corp. | | 1000—325.9 & 422.3 |
| WKY | Oklahoma, Okla., E. C. Hull and H. S. Richards | | 100—275 |
| WLAL | Tulsa, Okla., First Christian Church | | 100—250 |
| WLAP | Louisville, Ky., W. V. Jordan | | 20—275 |
| WLBL | Stevens Point, Wis., Wisconsin Department of Markets | | 500—278 |
| WLIB | Elgin, Ill. (near), Liberty Weekly | | 4000—302.8 |
| WLIT | Philadelphia, Pa., Lit Bros. | | 500—394.5 |
| WLS | Crete, Ill., Sears, Roebuck & Co. | | 5000—344.6 |
| WLSI | Cranston, R. I., Dutee W. Flint Lincoln Studios (Inc.) | | 500—440.9 |
| WLTS | Chicago, Ill., Lane Technical High School | | 100—258 |
| WLW | Harrison, Ohio, Crosley Radio Corp. | | 500 & 5000—422.3 |
| WLWL | New York, N. Y., Missionary Society of St. Paul the Apostle | | 1500—288.3 |
| WMAC | Cazenovia, N. Y., Clive B. Meredith | | 100—275 |
| WMAF | Dartmouth, Mass., Round Hills Radio Corp. | | 1000—440.9 |

(*Continued on page* 1163)


**Brain-Feast**

Solvent fruit, such as grapefruit, berries, tomatoes UNDER PROPER CONDITIONS:
(1) Dissolve or disintegrate tumors, goitres, gallstones, deposits of lime in joints.
(2) Dissolve phlegm or mucus, remove the source of colds, catarrh and consumption.
(3) Correct liver and kidney troubles; headaches.
(4) Dissolve blood clots as in paralysis.
(5) Dissolve the impurities which cause blemishes to the skin, as acne, eczema.

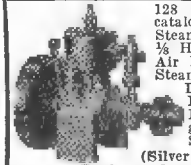
**INTENSIVE FEEDING, JUICES, NO WATER**

New rich blood builds healthy tissue, displacing diseased tissue. No diagnosis required, only activities. Write us for particulars of Government Bulletins, describing experiments on convicts, hens, cows, etc. Deficient feeding produced disease, whereas **full nutrition cured,** e. g., paralysis, blindness in hens, rats, etc.; pellagra, beriberi, skin affections, etc., in men.
The following extracts are from sworn statements of pupils:
PARALYSIS. Age 61. Right hand and leg helpless three years, restored in three weeks.
Another, age 65, bedridden, hemiplegia. Sensation restored in three days. Could walk two miles daily after six weeks.
ARTHRITIS. All joints swollen with lime deposits. Knees and wrists locked immovable for eight months. Blind for two years. Can now see, walk and do home work.
CATARRH, HAY FEVER, RESULTING DEAFNESS decreased from the first meal.
GALLSTONES. Age 80. Bedridden, cholic every week for years, but not one attack since instruction over a year ago; now can do housework.
TUMORS. Age 40. Tumors weighing several pounds dissolved within a year.
GOITRE. Collar reduced 17 to 15, normal size.
UTERINE HEMORRHAGE. Age 50. Three years in rolling chair; weak from constant discharges. Now does housework, including washing.
ECZEMA. Age 69. Eyebrows lost. Skin cracked and scaling. Normal in three months.
PYORRHOEA. Age 65. Pus ceased on 7th day.
PREGNANCY. Age 30. With last two children suffered no nausea, no swollen feet, nor constipation as previously. Delivery painless.
CONSTIPATION. Three Healthy Eliminations Daily.
BRAINY MEALS make mental work easy. Muscle nourishing meals build firm flesh. Sworn statements. **Over 6,000 pupils.** Educational book, 10 cents.

**BRINKLER SCHOOL OF EATING**
Dept. 61 131 West 72nd Street New York

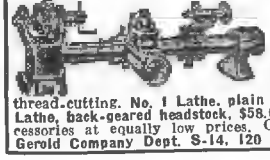
RADIO-AERIAL-WIRE
**Sheelorcon**
"80% CONDUCTIVITY"
Brings distant signals in more clearly. Original 19-strand non-corrosive. Block tin coated. Flexible, easily handled.
IF YOUR DEALER CAN'T SUPPLY YOU
**Send $1.00** for 100 foot trial coil sent postpaid.
**BUFFALO WIRE WORKS COMPANY**
524 Terrace, Buffalo, N. Y. or 9-11 So. 7th Street, Philadelphia, Pa.

**MODELMAKER**
A new magazine for all interested in making
**WORKING MODELS**
*Send 10 cents for Sample Copy*
MODELMAKER, 120 S. Liberty St., New York



128 Pages: Bigger than ever. New catalog No. 26. 40 kinds and sizes Steam, Gas and Gasoline Engines. ⅛ H. P. and up. Toy and Motor Hot Air Engines, Model Airplane Motors, Steam Boilers, Pumps, Lathes and Drill Presses. ¾ H. P. Marine Engines, Locomotive Wheels and Blue Prints, Gears, Pulleys, Engine Castings and Model Makers' Supplies. Sent anywhere 25c stps., (Silver preferred). Refunded first order.
Modern Engine & Supply Co., 514 W. Van Buren St.

**WADE BENCH LATHE**



Cap: 4" dia. x 12" length. Sliderest has travel entire length of bed. Lead-screw inside bed. Hollow spindle. Turning, facing, boring, drilling, winding, thread-cutting. No. 1 Lathe, plain headstock, $28.00. No. 2 Lathe, back-geared headstock, $58.00. Complete line of accessories at equally low prices. Catalog sent free. The Geroid Company Dept. S-14, 120 Liberty St., New York.


www.americanradiohistory.com

# Two Great Radio Books In One

## 200 PAGES—300 ILLUSTRATIONS

**HOOK-UPS**

Plenty of new and practical hook-ups, illustrated and explained in a constructional and non-technical manner. For the radio set builder and amateur.

**RADIO ENCYCLOPEDIA**

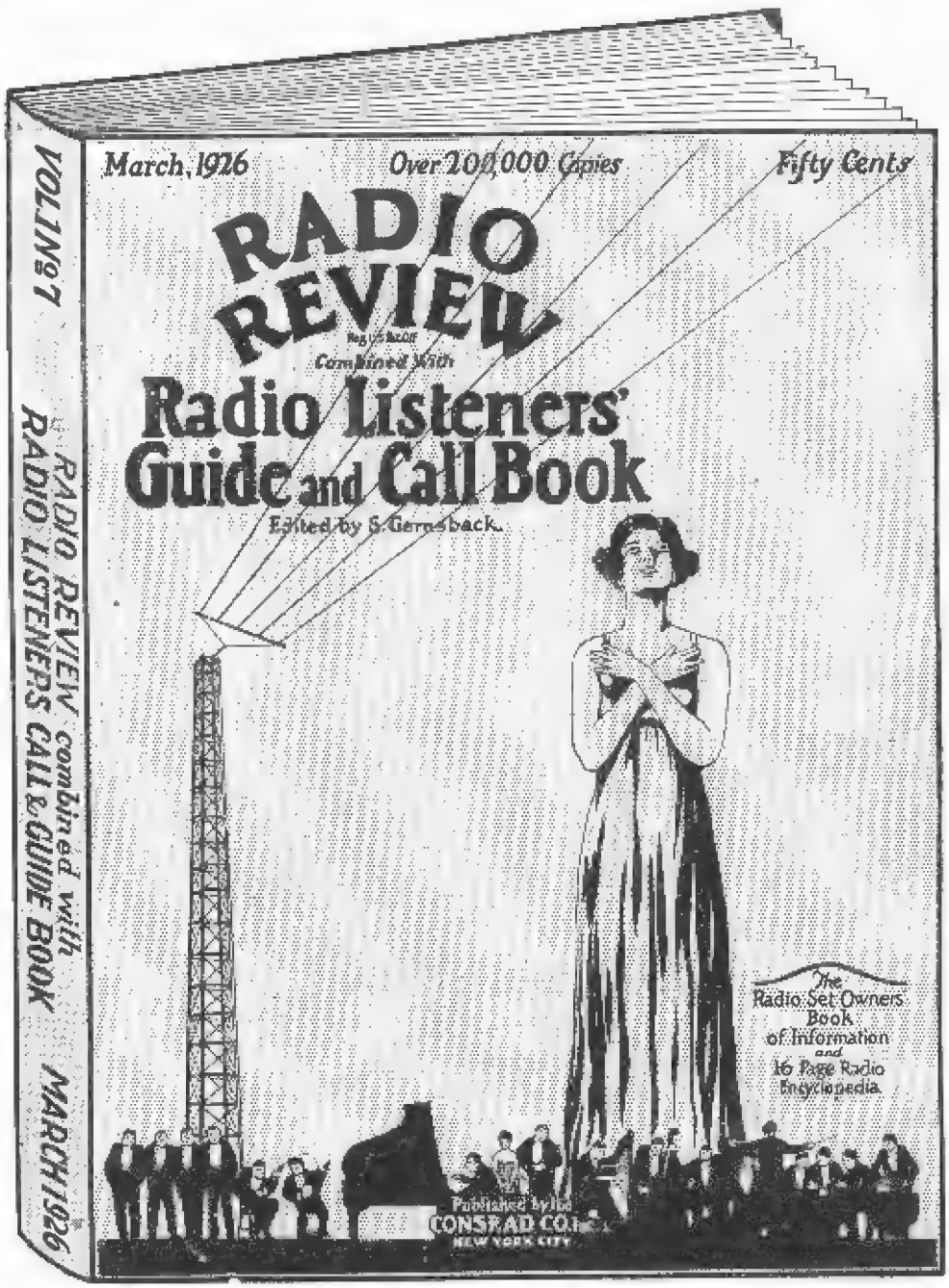
Every issue contains an instalment of S. Gernsback's Radio Encyclopedia. The first complete, authentic work of its kind. Valuable to everyone interested in radio.

**CALL BOOK**

This is a very valuable reference, a complete list of Broadcast stations, Canadian stations and foreign broadcast stations. The most complete list of its kind. Each list arranged for logging stations with dial setting record blanks.

**RADIO LISTENERS INFORMATION**

This section gives many hints and ideas on the care and operation of a receiving set, together with practical information on radio from the listener's point of view.


VOLUME 7
RADIO REVIEW combined with RADIO LISTENERS CALL & GUIDE BOOK
MARCH 1926
March, 1926
Over 200,000 Copies
Fifty Cents
RADIO REVIEW
Combined With
Radio Listeners' Guide and Call Book
Edited by S. Gernsback
The Radio Set Owners Book of Information and 16 Page Radio Encyclopedia
Published by the CONSRAD CO. Inc.
NEW YORK CITY

**The Most Valuable Radio Book of its kind-for Beginners, Broadcast Listeners and Amateurs**

SOLD ON ALL NEWSSTANDS

Now the RADIO LISTENERS' GUIDE and CALL BOOK is combined with RADIO REVIEW and will be issued four times a year in one great complete volume.

Each issue of this great new book contains a complete digest of practical radio hook-ups culled from radio press throughout the world, S. Gernsback's well known radio encyclopedia, in installments, an international radio press digest of news and information, a complete accurate list of Broadcast station call letters, and a valuable section replete with information for the Broadcast listener.

Published in the large Magazine size, contains 200 pages and more than 300 illustrations ALL FOR 50c the COPY. Watch for the first issue on all newsstands and all radio stores beginning February 1st.

You will buy the biggest value in wealth of radio reference material ever printed for the radio broadcast listener, amateur or professional.

**50c PER COPY**

*Published and Distributed by*

**The Consrad Co. Inc. 64 Church St. New York, N.Y.**


www.americanradiohistory.com

Play the HAWAIIAN GUITAR Just as the Natives Do
FREE when you enroll
$15 HAWAIIAN GUITAR and Case
Only 4 Motions used in playing this fascinating instrument. Our native Hawaiian instructors teach you to master them quickly. Pictures show how. Everything explained clearly.

**Play in Half Hour**
After you get the four easy motions you play harmonious chords with very little practice. No previous musical knowledge necessary.

**Easy Lessons**
Even if you don't know one note from another, the 52 printed lessons and the clear pictures make it easy to learn quickly. Pay as you play.

**Free Guitar**
and Outfit in Genuine Seal Grain Fabrikoid Case as soon as you enroll. Nothing to buy—everything furnished. No delay.

**Write at Once**
You'll never be lonesome with this beautiful Hawaiian Guitar. Write for Special Offer and easy terms. A postcard will do. ACT!

**FIRST HAWAIIAN CONSERVATORY of MUSIC, Inc.**
**9th Floor, Woolworth Bldg., Dept.— 140 New York, N. Y.**
*Approved as a Correspondence School Under the Laws of the State of New York*

**HERE'S MORE MONEY for YOU**

**150 Home-Study Books**

Each of these sure pay raising, self-help books is a complete course of instruction. They cover Electricity, Automobile, Machine Shop, Carpentry, Painting, Engineering, Railroading and twenty other trades. Full catalogue FREE. A post-card brings yours.

**F. J. DRAKE & CO., Publishers**
**1009 S Michigan Avenue, Chicago**

# Learn to Draw at Home

Become an artist through an amazingly easy method—right at home in spare time. Learn Illustrating, Designing, Cartooning. Trained artists earn from $50 to over $250 a week. FREE BOOK tells all about this simple method of learning to draw and gives details of special free offer. Mail postcard now.

WASHINGTON SCHOOL OF ART
Room 264-D, 1115-15th St., N. W., Washington, D. C.

**Electrical Engineering In One Year**

Course for men of ambition and limited time. Over 4000 men trained. Condensed course in Theoretical and Practical Electrical Engineering including the closely related subjects of Mathematics and Mechanical Drawing taught by experts. Students construct motors, install wiring, test electrical machinery. Complete course

**Prepare for your profession in the most interesting city in the world.** School established 1893. Send for catalog.

**BLISS ELECTRICAL SCHOOL**
444 Takoma Ave., Washington, D. C.

**4 or 6½ Barrel**
**6-Shot Finest Long Range Revolver**
**Cut to $6.25**

This gun "free" if you can beat our price anywhere—4 or 6 in. barrel, blue or nickel—32, 38-or 22 caliber. Powerful, accurate, hard hitting. Money back guarantee. Pay on delivery $6.25 Federal Mail Order Co. 414 Broadway, New York, Dept. X80

**WANT WORK AT HOME?**

Earn $18 to $60 a week RETOUCHING photos. Men or women. No selling or canvassing. We teach you, guarantee employment, and furnish WORKING OUTFIT FREE. Limited offer. Write today. Arteraft Studios, Dept. 45, 3590 Sheridan Rd., Chicago.

**Print Your Own**

Cards, Stationery, Circulars, Paper, etc. Save money. Print for others, big profit. Complete outfits $8.85 Job press $12, $35. Rotary $150. All easy, rules sent. Write for catalog presses type etc. **THE PRESS CO., Y 47, Meriden, Conn.**

**CLASS RINGS & PINS**
**Largest Catalog Issued—FREE**

Samples loaned class officers. Prices $.20 to $8.00 each. No order for class, society, club emblems too large or too small. Special designs made on request.

**METAL ARTS CO., Inc.** 7723 South Ave., Rochester, N. Y.


(*Continued from page 1161*)

| Call Letters | Location and Name | Power & Wave Length |
|---|---|---|
| WMAK | Lockport, N. Y., Norton Laboratories | 500—266 |
| WMAL | Washington, D. C., M. A. Leese Optical Co. | 15—212.6 |
| WMAN | Columbus, Ohio, First Baptist Church | 50—278 |
| WMAQ | Chicago, Ill., Chicago Daily News | 1000—447.5 |
| WMAY | St. Louis, Mo., Kingshighway Presbyterian Church | 100—248 |
| WMAZ | Macon, Ga., Mercer University | 500—261 |
| WMBB | Chicago, Ill., American Bond & Mortgage Co. | 500—250 |
| WMBC | Detroit, Mich., Michigan Broadcasting Co. (F. G. Siegel) | 100—256.4 |
| WMBF | Miami Beach, Fla., Fleetwood Hotel Corp. | 500—384.4 |
| WMC | Memphis, Tenn., "Commercial Appeal" | 500—499.7 |
| WMCA | Hoboken, N. J., Hotel McAlpin (Greeley Square Hotel Co.) | 500—340.7 |
| WNAB | Boston, Mass., Shepard Stores | 100—250 |
| WNAC | Boston, Mass., Shepard Stores | 500—280.2 |
| WNAD | Norman, Okla., University of Oklahoma | 500—254 |
| WNAL | Omaha, Nebr., Omaha Central High School | 50—258 |
| WNAT | Philadelphia, Pa., Lenning Brothers Co. | 100—250 |
| WNAX | Yankton, S. Dak., Dakota Radio Apparatus Co. | 100—244 |
| WNBH | New Bedford, Mass., Irving J. Vermilya and A. J. Lopez | 250—248 |
| WNJ | Newark, N. J., Radio Shop of Newark | 150—252 |
| WNOX | Knoxville, Tenn., Peoples Telephone & Telegraph Co. | 100—268 |
| WNYC | New York, N. Y., City of New York | 1000—526 |
| WOAI | San Antonio, Tex., Southern Equipment Co. | 2000—394.5 |
| WOAN | Lawrenceburg, Tenn., James D. Vaughn | 500—282.8 |
| WOAW | Omaha, Nebr., Woodmen of the World | 1000—526 |
| WOAX | Trenton, N. J., Franklyn J. Wolff | 500—240 |
| WOC | Davenport, Iowa, Palmer School of Chiropractic | 5000—483.6 |
| WOCL | Jamestown, N. Y., Hotel Jamestown | 15—275 |
| WODA | Paterson, N. J., O'Dea Temple of Music | 250—224 |
| WOI | Ames, Iowa, Iowa State College | 750—270 |
| WOK | Homewood, Ill., Neutrowound Radio Mfg. Co. | 5000—217.3 |
| WOKO | New York, N. Y., Otto Baur | 50—233 |
| WOO | Philadelphia, Pa., John Wanamaker | 500—508.2 |
| WOOD | Grand Rapids, Mich., Grand Rapids Radio Co. | 500—242 |
| WOQ | Kansas City, Mo., Unity School of Christianity | 1000—278 |
| WOR | Newark, N. J., L. Bamberger & Co. | 500—405.2 |
| WORD | Batavia, Ill., Peoples Pulpit Association | 5000—275 |
| WOS | Jefferson City, Mo., Missouri State Marketing Bureau | 500—440.9 |
| WOWL | New Orleans, La., Owl Battery Co. | 10—270 |
| WOWO | Fort Wayne, Ind., Main Auto Supply Co. | 500—227 |
| WPAK | Agricultural College, N. Dak., North Dakota Agricultural College | 50—275 |
| WPCC | Chicago, Ill., North Shore Congregational Church | 500—258 |
| WPG | Atlantic City, N. J., Municipality of Atlantic City | 500—299.8 |
| WPRC | Harrisburg, Pa., Wilson Printing and Radio Co. | 100—215.7 |
| WPSC | State College, Penna., Pennsylvania State College | 500—261 |
| WQAA | Parkesburg, Pa., Horace A. Beale, Jr. | 500—220 |
| WQAC | Amarillo, Texas, Gish Radio Service | 100—234.2 |
| WQAE | Springfield, Vt., Moore Radio News Station | 50—246 |
| WQAM | Miami, Fla., Electrical Equipment Co. | 100—263 |
| WQAN | Scranton, Pa., Scranton Times | 100—250 |
| WQAO | New York, N. Y., Calvary Baptist Church | 100—360 |
| WQJ | Chicago, Ill., Calumet Rainbo Broadcasting Co. | 500—447.5 |
| WRAF | Laporte, Ind., The Radio Club, Inc. | 100—224 |
| WRAM | Galesburg, Ill., Lombard College | 100—244 |
| WRAV | Yellow Springs, Ohio, Antioch College | 100—263 |
| WRAW | Reading, Pa., Avenue Radio & Electric Shop | 10—238 |
| WRAX | Gloucester City, N. J., Flexon's Garage | 500—268 |

(*Continued on page 1165*)


# World's Greatest Thought Discovery

**ALPHAMATHOLOGY**

Perpetual Scale, without beginning or end, in Cycle, or Vibration with Cosmic energy—The Key to the Universe!

A.D. 1926-FPZF
Jewish y'r 5686-FPZF
Japanese y'r 2586-FPZF
Julian Period in year 66 hundred-FPZF

**Psychology — on — mathematical — basis**

# FORETELL BY SCALE

The psychological color scheme, the styles, the advertising leads, the winning letters in names day after day and year after year.

**Winning energy correct in Fifty-four consecutive games of World's Baseball Series since 1921 and Dixie Series since 1923—Either the Psychology of Place, the Pitcher, or an *individual Player in* VIBRATION made an outstanding play, hit or catch that won the game.**

**In Business, or otherwise, tune-in your conscious Intellectual Energy with subconscious urge, or Solar Energy and win!** Be sure you are in **Vibration** and then go ahead. A "Good Name" in vibration with the public's subconscious mind is worth $80,000,000.

"Mass Intellectual-Pressure and the Alpha-Matho Vibratory Scale"—48-page booklet containing the greatest thought Discovery of this or any other age, with Brain-Wave or Alpha-Matho Calendar—Price $1.00.

**Twelfth Edition; Sold Around the World**

(The Yorkshire Institute of England placed order for 500 copies and Books and Authors, New York, June issue, "challenges the scientists.")

**MACK STAUFFER, 918 West Terrell Avenue, Fort Worth, Texas, U. S. A.**

*Money back and 10 per cent in five days, if desired*

**Credentials:** Author of the World's Greatest Prophetic and Psychological novel, **"Humanity and the Mysterious Knight,"** which foretold the broadcasting of "human voice," Marconi's new invention, the "reflector," "color music," "World War," the election of President "H." and over one hundred other world events.

# Power AND Light Weight!

TO the finest sport in the world — *outboard motor boating*—this great new Super Elto brings still higher standards of thrilling performance, of extraordinary power combined with *light, compact portability.*

Now — 4 horsepower (full 4 h. p., S. A. E. rating) yet not an ounce of increased weight!

And to superb performance and light weight, *add* instant starting and unparalleled dependability. And *add* full steering and motor control from any part of the boat — trouble-free propello-pump — and a dozen other valuable features. All are described in intensely interesting new free catalog. Write for it today!

ELTO OUTBOARD MOTOR COMPANY
Ole Evinrude, President
Dept. 48 Mfr's Home Bldg., Milwaukee, Wis.

"Starts on a quarter turn"
**Super Elto**

# AGENTS we offer YOU

**The Opportunity to get into a Permanent Business for Yourself representing our extensive Line of 250 Products in your territory. Sure Repeaters.—30 years on Market. Our 11 piece Toilet Goods Assortment at $2.00 with a 2 piece Carving Set FREE to your Customers is one big winner. Part time accepted, but full time will net you $50, $60, up to $75 a week.**

**Easy to Average $50.00 a Week.**

What more could you ask while introducing line of Soaps, Toilet Articles, Food Specialties, Polishes, Remedies, etc. at **Attractive Prices. 100% profit. Write Today** for Illustrated Circular explaining our **Unique Sales Plans.** Act Now.

**E. M. DAVIS COMPANY Dept. 6740 CHICAGO**

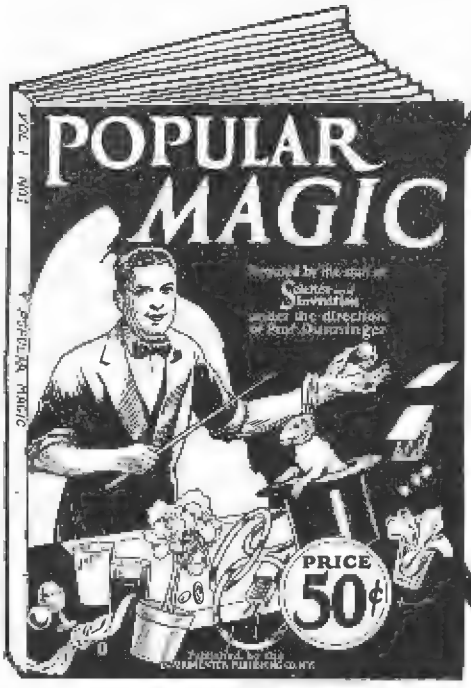


**The Famous KON-VER-TER Slide Rule**

Instantly adds, subtracts, divides, multiplies, converts fractions or decimals of an inch. Gives sines, co-sines, versed sines, co-versed sines, tangents, co-tangents, secants co-secants of angles directly. Gives square roots, squares, cube roots, cubes and fifth roots and powers of all numbers. Logarithms, co-logarithms, anti-logarithms. Instructions with rule. DeLuxe Model $3. Cash or C.O.D

**New England Novelty Company**
Wakefield, Mass.


www.americanradiohistory.com




# Step Into the Limelight

Compiled
by the Staff of
Science and Invention
under the direction of
PROF. DUNNINGER

The man who mystified the Prince of Wales, Ex-Presidents Harding, Taft, Roosevelt, President Coolidge and other celebrities.

## POPULAR MAGIC

**116 Pages**

*Size 9 x 12 Inches*

**500 Illustrations**

| | |
|---|---|
| including | Chemical tricks |
| Card tricks | Lyceum tricks |
| Dice tricks | Stage tricks |
| Match tricks | Popular Magic |
| Amateur tricks | Spirit tricks |

**50c The Copy**

## Surprise Your Friends with a Mastery of Mystery

Be the popular man in your circle of friends. You can entertain them and hold their attention with a thousand surprises and novelties.

POPULAR MAGIC is a book for you, for everybody, young or old. But especially for those who want popularity, those who want to realize how much the admiration of friends helps toward making life worth more.

POPULAR MAGIC contains thousands of simple, entertaining parlor tricks, as many puzzling magical stunts and a whole book full of mystic spirit novelties. A new set of tricks for every day of the year. Compiled from the great magazine "SCIENCE *and* INVENTION."

GET THIS GREAT BOOK TODAY. Chock full of Tricks, Novelties, Mystic performances, Master sleights-of-hand, Gags, Disappearing acts. All kinds of fun. Buy a copy or order direct. PRICE, 50c.

EXPERIMENTER PUB. CO., Inc.
53 Park Place, New York, N. Y.

Gentlemen:—Enclosed find 50c for which send me one copy of POPULAR MAGIC.

Name .....

Address .....

City ..... State .....

POPULAR MAGIC is sold on all newsstands. You can obtain a copy today from your news dealer or you can use the coupon on this page and order direct enclosing 50c money order or stamps.

*Published by*

**Experimenter Publishing Co., Inc.**
**53 Park Place New York, N. Y.**

www.americanradiohistory.com

# Music Lessons
WITH AN ACCREDITED SCHOOL
# At Home

**A Complete Conservatory Course By Mail** Wonderful home study music lessons under great American and European teachers. Endorsed by Paderewski. Master teachers guide and coach you. Lessons a marvel of simplicity and completeness.

The only recognized Conservatory of Music giving lessons by the UNIVERSITY EXTENSION METHOD.

The ideal of a genuine Conservatory of Music for home study based upon lessons containing the cream of the life's teaching experience of Master Musicians, reinforced by the individual instruction of specialists, is now attained.

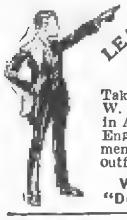
*The instruction of a master—the individual touch of an accomplished teacher—is yours to command from the very moment you enroll.*

The University Extension Conservatory, by adopting the Personal Instruction Method, has placed home music study beyond question as to results. Anyone can learn at home.

**Any Instrument** Write telling us course you are interested in—Piano, Harmony, Voice, Public School Music, Violin, Cornet, Mandolin, Guitar, Banjo, or Reed Organ—and we will send our Free Catalog with details of course you want. Send now.

**UNIVERSITY EXTENSION CONSERVATORY**
280 Siegel-Myers Building Chicago, Illinois

SEE PAGE 1160
COMPLETE DATA ON THE NEWEST STORY MAGAZINE
**Amazing Stories**
New Novel


LEARN **Aviation**

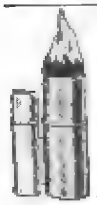
Take a W. A. C. Course in Applied Airplane Engineering. Many men earn $2000 to $10,000 a year. Big Free outfit of airplane parts. Write for Free catalog.

WESTERN AIRPLANE CORPORATION
"Dept. S-4" Monadnock Blk., Chicago, Ill.

**"Bow Legs and Knock-Knees" Unsightly**

Send for booklet showing photos of men with and without THE PERFECT LEG FORMS.

PERFECT SALES CO.
140 N. Mayfield Ave., Dept. 50, Chicago, Ill.


NEW METHOD Self Starting POCKET LIGHTER
*What Makes It Light?*
No wind can blow it out.
The Wonder Light A Scientific Marvel **50c**
Triple Gold Plated, $1.00. Fully Guaranteed.
NEW METHOD MFG. CO.
Dept. S-1-4 Bradford, Pa.
Dealers—Ask your jobber for this ready seller

**Straightens Shoulders —Increases Pep**

THE NATURAL BODY BRACE—Corrects stooping shoulders, straightens the back, gives the lungs chance for normal expansion, induces proper breathing. Brings restful relief, comfort, energy, and pep. For men and women.

**Costs nothing to try it**
Write for 30 days free trial offer and free book.
NATURAL BODY BRACE CO.
Howard C. Rash, Pt. 286 Rash Bldg., Salina, Kansas

**LEARN TO DRAW!**
Remarkable book—"COMMERCIAL ART AND CARTOONING." Explains how to make illustrations for books, advertisements, etc. Also how to become a Cartoonist. NO CORRESPONDENCE COURSE—Book tells all—14 chapters—125 illustrations. Explains Elementary Drawing; Still Life; Pen, Ink, Charcoal and Crayon Work; Cartooning, etc. Bound Flexible, Im. Leather. Postpaid for $2.00 (C. O. D. 17c extra). OGILVIE PUB. CO., 57 Rose Street, New York. Dept. 139

**"BECOME A LIGHTNING TRICK CARTOONIST"**
Send $1.00 for Beginners Instructions with Laugh Producing Program of 23 Comic Trick drawings. Catalog of Chalk Talk Supplies Free.
BALDA ART SERVICE, Dept. 4, Oshkosh, Wisconsin


(*Continued from page* 1163)

| Call Letters | Name | Location | Power & Wave Length |
|---|---|---|---|
| WRBC | Valparaiso, Ind., Immanuel Lutheran Church | | 500—278 |
| WRC | Washington, D. C., Radio Corp. of America | | 1000—468.5 |
| WRCO | Raleigh, N. C., Wynne Radio Co. | | 100—252 |
| WREC | Coldwater, Miss., Wooten's Radio & Elec. Co. | | 10—254 |
| WREO | Lansing, Mich., Reo Motor Car Co. | | 500—285.5 |
| WRHF | Washington, D. C., Washington Radio Hospital Fund | | 50—258 |
| WRHM | Minneapolis, Minn., Rosedale Hospital | | 50—252 |
| WRK | Hamilton, Ohio, Doron Bros. Electrical Co. | | 100—270 |
| WRM | Urbana, Ill., University of Illinois | | 500—273 |
| WRMU | Richmond Hill, N. Y., M U-1 (Yacht) A. H. Grebe | | 100—236 |
| WRNY | New York, N. Y., Experimenter Publishing Co. | | 500—258 |
| WRR | Dallas, Tex., City of Dallas, Police and Fire Signal Department | | 500—246 |
| WRST | Bay Shore, N. Y., Radiotel Mfg. Co. | | 250—215.7 |
| WRVA | Richmond, Va., Larus & Bro. Co. | | 1000—256 |
| WRW | Tarrytown, N. Y., Tarrytown Radio Research Laboratory (Koenig Bros.) | | 500—273 |
| WSAI | Mason, Ohio, United States Playing Card Co. | | 5000—325.9 |
| WSAJ | Grove City, Pa., Grove City College | | 250—229 |
| WSAN | Allentown, Pa., Allentown Call Publishing Co. | | 100—229 |
| WSAR | Fall River, Mass., Doughty & Welch Electrical Co. | | 100—254 |
| WSAU | Chesham, N. H., Camp Marienfeld | | 10—229 |
| WSAX | Chicago, Ill., Zenith Radio Corp. | | 100—268 |
| WSAZ | Pomeroy, Ohio, Chase Electric Shop | | 50—244 |
| WSB | Atlanta, Ga., Atlanta Journal | | 1000—428.3 |
| WSBC | Chicago, Ill., World Battery Co. | | 1000—209.7 |
| WSBF | St. Louis, Mo., Stix Baer & Fuller | | 250—273 |
| WSBT | South Bend, Ind., South Bend Tribune | | 250—275 |
| WSDA | New York, N. Y., City Temple | | 250—203 |
| WSKC | Bay City, Mich., Worlds Star Knitting Co. | | 100—261 |
| WSM | Nashville, Tenn., National Life & Accident Ins. Co. | | 1000—282.8 |
| WSMB | New Orleans, La., Saenger Amusement & Maison Blanche Co. | | 500—319 |
| WSMH | Owosso, Mich., Shattuck Music House | | 20—240 |
| WSMK | Dayton, Ohio, S.M.K. Radio Corp. | | 500—275 |
| WSOE | Milwaukee, Wis., School of Engineering of Milwaukee | | 500—246 |
| WSRO | Hamilton, Ohio, Radio Co. (Harry W. Fahrlander) | | 100—252 |
| WSSH | Boston, Mass., Tremont Temple Baptist Church | | 100—261 |
| WSUI | Iowa City, Iowa, State University of Iowa | | 500—483.6 |
| WSVS | Buffalo, N. Y., Seneca Vocational School | | 50—218.8 |
| WTAB | Fall River, Mass., Fall River Daily Herald Publishing Co. | | 100—266 |
| WTAD | Carthage, Ill., Robert E. Compton | | 50—236 |
| WTAG | Worcester, Mass., Worcester Telegram Publishing Co. | | 500—268 |
| WTAL | Toledo, Ohio, Toledo Radio & Electric Co. | | 10—252 |
| WTAM | Cleveland, Ohio, Willard Storage Battery Co. | | 3500—389.4 |
| WTAP | Cambridge, Ill., Cambridge Radio & Electric Co. | | 50—242 |
| WTAQ | Osseo, Wis., S. H. Van Gorden & Son | | 100—254 |
| WTAR | Norfolk, Va., Reliance Electric Co. | | 100—261 |
| WTAW | College Station, Tex., Agricultural & Mechanical College of Texas | | 500—270 |
| WTAX | Streator, Ill., Williams Hardware Co. | | 50—231 |
| WTAZ | Lambertville, N. J., Thomas J. McGuire | | 15—261 |
| WTIC | Hartford, Conn., Travelers Insurance Co. | | 500—475.9 |
| WWAD | Philadelphia, Pa., Wright & Wright, Inc. | | 250—250 |
| WWAE | Plainfield, Ill., Lawrence J. Crowley (Electric Park) | | 500—242 |
| WWAO | Houghton, Mich., Michigan College of Mines | | 250—263 |
| WWGL | Richmond Hill, N. Y., Radio Engineering Corp. | | 500—212.6 |
| WWI | Dearborn, Mich., Ford Motor Co. | | 500—266 |
| WWJ | Detroit, Mich., Detroit News | | 1000—352.7 |
| WWL | New Orleans, La., Loyola University | | 100—275 |

# This man is sure of his job

HE SAW the handwriting on the wall. Men around him were being dropped right and left. He might have been the next to go but for a familiar coupon which he saw in a magazine. He tore it out and mailed it to Scranton.

Then one day his employer called him in.

"Young man," he said, "I have just received a letter from the International Correspondence Schools telling me you have enrolled and have received a mark of 93 for your first lesson.

"I don't mind saying that this letter has saved your job. I had you on the list of men to be dropped. But I'm going to keep you now. And there are bigger things ahead for you. The man who thinks enough of his future to study his job is the kind of a man we want."

HOW about you? Are you sitting on the anxious bench wondering if you will be the next to go? Or are you training yourself so that you will not only be sure of your present job, but will be ready for the job ahead?

This is all we ask: Without cost or obligation, put it up to us to prove how we can help you. Just mark and mail this coupon.

**INTERNATIONAL CORRESPONDENCE SCHOOLS**
Box 6236-D, Scranton, Penna.
*Oldest and largest correspondence schools in the world*
Without cost, please tell me how I can qualify for the position or in the subject *before* which I have marked an X:

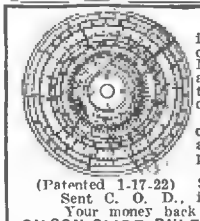
**BUSINESS TRAINING COURSES**

| | |
|---|---|
| ☐ Business Management | ☐ Salesmanship |
| ☐ Industrial Management | ☐ Advertising |
| ☐ Personnel Organization | ☐ Better Letters |
| ☐ Traffic Management | ☐ Show Card Lettering |
| ☐ Business Law | ☐ Stenography and Typing |
| ☐ Banking and Banking Law | ☐ Business English |
| ☐ Accountancy (including C.P.A.) | ☐ Civil Service |
| ☐ Nicholson Cost Accounting | ☐ Railway Mail Clerk |
| ☐ Bookkeeping | ☐ Common School Subjects |
| ☐ Private Secretary | ☐ High School Subjects |
| ☐ Spanish ☐ French | ☐ Illustrating |

**TECHNICAL AND INDUSTRIAL COURSES**

| | |
|---|---|
| ☐ Electrical Engineering | ☐ Architect |
| ☐ Electric Lighting | ☐ Architects' Blueprints |
| ☐ Mechanical Engineer | ☐ Contractor and Builder |
| ☐ Mechanical Draftsman | ☐ Architectural Draftsman |
| ☐ Machine Shop Practice | ☐ Concrete Builder |
| ☐ Railroad Positions | ☐ Structural Engineer |
| ☐ Gas Engine Operating | ☐ Chemistry ☐ Pharmacy |
| ☐ Civil Engineer | ☐ Automobile Work |
| ☐ Surveying and Mapping | ☐ Airplane Engines |
| ☐ Metallurgy ☐ Mining | ☐ Agriculture and Poultry |
| ☐ Steam Engineering ☐ Radio | ☐ Mathematics |

Name .....
Street Address ..... 6-26-25
City ..... State .....
Occupation .....
*If you reside in Canada, send this coupon to the International Correspondence Schools Canadian Limited, Montreal*


**CALCULATIONS**
in the Store, Office, Shop, Etc., can be instantly made with the Midget Slide Rule. If you have any figuring to do, order one on trial. It is the most versatile calculator ever invented.
The Engine-Divided Scales are on white celluloid, mounted on aluminum, grease- and waterproof. Size 4".
(Patented 1-17-22) Price, with Instruction Book, $1.50. Leather Case 50c extra. Sent C. O. D., if desired. Catalog free.
Your money back if you are not satisfied.
GILSON SLIDE RULE CO., Niles, Mich.

**CONCERTINA--Plays by Rolls**
Played by Anyone without Knowledge of Music

Pamphlets Free Postpaid
Latest Music
CHARLES PITTLE & CO., New Bedford, Mass


www.americanradiohistory.com

# Opportunity Ad-lets

YOU will find many remarkable opportunities and real bargains in these columns. It will pay you to read and investigate the offerings made every month by reliable firms, dealers and amateurs from all over the country. No matter what you may be seeking, whether supplies, automobile accessories, the opportunity to make money, or anything else, you will find listed here the best and most attractive specials of the month.

Advertisements in this section twelve cents a word for each insertion. Name and address must be included at the above rate. Cash should accompany all classified advertisements unless placed by an accredited advertising agency. No advertisement for less than 10 words accepted.

Ten per cent. discount for 6 issues, 20 per cent. discount for 12 issues. Objectionable or misleading advertisements not accepted. Advertisements for the June issue must reach us not later than April 10th.

**The Circulation of Science and Invention is over 150,000 and climbing every month**

EXPERIMENTER PUBLISHING CO., INC., 53 Park Place, New York City, N. Y.

## *Advertising Agents*

**Advertising** in all magazines and newspapers at publishers' lowest rates. Rate Book Free. Taylor's Advetrising Service, Dept. 6, Freeport, Ill.

## *Agents Wanted*

**Agents**—Best seller; Jem Rubber Repair for tires and tubes; supercedes vulcanization at a saving of over 800 per cent; put it on cold. It vulcanizes itself in two minutes and is guaranteed to last the life of the tire or tube; sells to every auto owner and accessory dealer. For particulars how to make big money and free sample, address Amazon Rubber Co., Dept. 601, Philadelphia, Pa.

**Agents—Write for Free Samples.** Sell Madison "Better-Made" Shirts for large Manufacturer direct to wearer. No capital or experience required. Many earn $100 weekly and bonus. Madison Company, 566 Broadway, New York.

**Big money and fast sales.** Every owner buys gold initials for his auto. You charge $1.50; make $1.35. Ten orders daily easy. Write for particulars and free samples. American Monogram Co., Dept. 71, East Orange, N. J.

**Earn $10 daily** silvering mirrors, plating and refinishing metalware, chandeliers, bedsteads, headlights, utfits furnished. N. Decie Laboratories, 1133 Broadway, New York.

**$60—$200 a week.** Genuine Gold Letters for store windows. Easily applied. Free samples Liberal offer to general agents. Metallic Letter Co., 441 B., North Clark, Chicago.

**$10 daily silvering mirrors,** plating and refinishing lamps, reflectors, autos, beds, chandeliers by new method. Outfits furnished. Write Gunmetal Co., Ave. D, Decatur, Ill.

**Only one sale a day means $200 per month!** Marvelous new adding machine. Retails $15.00. Work equals $350 machine. Adds, subtracts, multiplies, divides, automatically. Computes feet and inches. Speedy, accurate, durable, handsome. Five year guarantee. Offices, Stores, factories, garages, lumbermen buy one to dozen. A fortune for live agents. Write quick for protected territory and free trial. Lightning Calculator Co., Dept. W, Grand Rapids, Michigan.

**Bankrupt and Rummage Sales.** Make $50.00 daily. We start you, furnishing everything. Distributors, Dept. 171, 609 Division, Chicago.

**Wash clothes the new way.** Use the Torrent Automatic Washer. You will be delighted. Special offer to one in each locality. Storm Royalty Co., 3602 Enright Ave., St. Louis, Mo.

**No Dull Times Selling Food.** People must eat. Federal distributors make big money; $3,000 yearly and up. No capital or experience needed; guaranteed sales; unsold goods may be returned. We furnish you with license. Your $20.00 starting order sent on trust. Free Samples to customers — Repeat orders sure; Exclusive territory. Ask now. Federal Pure Food Co., SS2311 Archer, Chicago.

**Make Money Silvering Mirrors,** refinishing auto headlights, tableware, metal plating, bed steads, chandeliers. Outfits furnished. International Laboratories, Dept. 69, 309 Fifth Ave., New York.

**Agents**—No canvassing. No delivering. No money invested. Pleasant work. Big Money. Appointing local agents to introduce welcome foods. Welcome Products, 326 Harvey, Illinois.

**Quit Ringing Doorbells.** I made $800 monthly, no soliciting, no goods to buy. Why not you? Details free. R. McNewn, 326 Wilkinson, Omaha, Neb.

**At Last! Diamond Rival Discovered!** Amazing blue white Rajah Gem Astounds jewelry world and deceives experts. Beautiful sample case free! $100 weekly! Write quick! Rajah Diamond Co., Dept. F11, Salisbury, N. C.

**Marvelous New Invention 400 per cent. profit,** liquid quick mend for hosiery and fabrics, tremendous demand. Over hundred other fast sellers. Local and general agents. J. E. Johnson Co., Dept. 840, 69 E. South Water St., Chicago.

**$5 to $15 daily** (Sworn proof) Introducing New Guaranteed Hosiery. Must wear or replaced free. No capital or experience required. You simply write orders. We deliver and collect. YOUR PAY DAILY, monthly bonus besides. Spare time satisfactory. Samples furnished. All colors, grades including silks, lisles, chiffons. Macochee Textile Company, Card 6701, Cincinnati, Ohio.

**Mirrors Re-Silvered at Home.** Costs Less 5 cents per square foot; you charge 75 cents. Immense profits, plating like new, brassy, worn-off autoparts, reflectors, tableware, stoves, etc., outfits furnished. Details FREE. Sprinkle, Plater, 955, Marion, Indiana.

**Over 100% Profit.** Self Lighting Gas and Cigar Lighters. Everybody interested, repeat business. Sell individuals, dealers, subagents. Particulars FREE. S. I. Bernhardt, 127 West 30th, New York.

**A large Hosiery concern** wants responsible men and women as local representatives working spare time. Big success. Write for details. Jennings Co., Dept. 655, Dayton, Ohio.

**Big Money**—fast sales, every owner buys gold initials for his auto. You charge $1.50, make $1.44. Ten orders daily easy. Samples free. World Monogram, Dept 32, Newark, N. J.

**Build splendid business** making chipped glass number and name plates. Particulars free. Simplex Co., Dept. 93, 1133 Broadway, New York.

**Earn $5.00 Every Hour** Monogramming Automobiles. It's easy with our gold transfer letters, cost 5c. Get $1.50. Sample free. "Raleo," 1013 Washington, Boston, Mass.

## *Agents Wanted (continued)*

**Newest Invention!** Sells everywhere. Automatically prevents telephone and iron cords from tangling and kinking. $90 weekly. Samples for test if desired. Neverknot, Dept. G1, McClurg Bldg., Chicago.

**Manufacture in home or shop.** Newest, fast-selling, novelties, toys, preparations, mail-order, agents' goods. Free list reliable, plans, patterns, processes, commercial information. Manufacturers' Bureau, 3937L Tracy, Kansas City, Mo.

**Men wanted to sell my new puncture-proof inner tube.** Demonstrate by driving nails into tire. In tests have given good service after having 500 nail holes in them. Doubles tire mileage. Sold under money-back guarantee. Big money and exclusive territory. Free Tube Offer. Write L. M. Milburn, 334 West 47th, Chicago.

**$20 Daily.** World's greatest seller. Marvelous 3-in-1 home necessity. Retails $3.50. Amazing plan. No capital. Write today, C125, Lobl Company, Middleboro, Mass.

**Agents: America's fastest selling shirt,** lumberjack and necktie line. $100.00 weekly easy. Shirts as low as 2 for $2.95. Big commission and bonus. Free gifts insure volume sales. Elaborate outfit free to first 500 who write. Howard Shirt Co., 105 So. Dearborn, Dept. 112, Chicago.

**If I send you Shoes** made-to-your measure in any one 69 leathers, 50 different styles, will you keep them, wear them, show them to your friends as sample of my $10 Made-to-Order shoes to sell at $6.85. Advise me today. Your sample outfit will go forward absolutely free at once. Dept. 8079, Forrest Dustin, 932 S. Wrightwood Ave., Chicago.

## —PROOF—

### That Classified Advertising Pays

Pisgah, Ala.,
Jan. 27th, 1926

SCIENCE & INVENTION:

I am using a number of the big national magazines and I regard Science & Invention one of the best. I have been with you about four years and have no intention of cancelling my advertisement. Very truly yours,

LEE MOUNTAIN.

### —still another one

Oshkosh, Wis.
Jan. 25th, 1926.

SCIENCE & INVENTION:

My advertisement has been appearing month after month in your publication and the results have always come out way on top. Very truly yours,

OAKS MAGICAL CO.

***Read Our Rates at Top of Page Then Send Your Order***

**Marvelous Invention!** Does away with phonograph needles. Preserves records. Saves $25 in needles. Pays $90 weekly. Sample on approval if requested. Everplay, Desk E-4, McClurg Bldg., Chicago.

**Selling Like Blazes!** Eleven piece toilet goods assortment at $2.00 with two piece carving set FREE to your customers. 100% profit. Davis Products Co., Dept. 67, 1311 Carroll, Chicago.

**"Gets-U-Out" Tire Lug.** New Patented Auto Accessory. Just out. One minute demonstration. Sure sale. Absolutely prevents auto getting stuck in mud, sand or snow. Big profits. Money back guarantee. Write for exclusive sales territory. Arthur J. Benson, 47th and Shields Ave., Room 419, Chicago.

**Furniture refinishing,** polishing, painting, handyman shop; wonderful profits; start yours on nearly nothing. John Braceland, 1459 So. Ninth, Philadelphia, Pa.

**Agents**—Snappiest household line on earth. Red hot sellers, steady repeaters—100% profit. 300 light weight, fast selling, popular priced necessities. Selling outfit free. Get busy quick—Write today, postal will do. American Products Co., 5809 American Bldg., Cincinnati, Ohio.

**Succeed With Your Own Products.** Make them yourself. Formulas, Processes, Trade-Secrets. Modern Master methods. Catalog free. D. Thaxly Co., Washington, D. C.

## *Aviation*

**Boys**—Get a three-foot model aeroplane free. Write to Aero Shop, 3050 Hurlbut Ave., Detroit, Mich.

## *Battle Photos and War Relics*

For Dens: Relics Collected from Europe's Battlefields. Firearms, medals, helmets, etc. Illustrated catalogue and sample War photographs 25c. Lieut. Welch, 1889 Albany Ave., Brooklyn, N. Y.

## *Books*

Free—Upon request will send you my literature illustrating the following books. Astrology, Character, Clairvoyance. Concentration, Healing, Hypnotism, Magnetism, Mediumship, Personal Magnetism, Personality, Physiognomy, Salesmanship, Seership, Success, Sex, Will. Yogi Philosophy, Gazing Crystals, etc. A. W. Martens, E. E. 6, Burlington, Iowa.

**"Master Key"** Success Wonderful. 410 Pages, cloth, $2.65. Bargain lists 10c. Phipps Library, 1014 Belmont, Chicago

## *Business Opportunities*

**Free Book.** Start little Mail Order business. Pier, 996 Cortland Street, New York.

**You can have a business-profession** of your own and earn big income in service fees. A new system of foot correction; readily learned by anyone at home in a few weeks. Easy terms for training, openings everywhere with all the trade you can attend to. No capital required or goods to buy, no agency or soliciting. Address Stephenson Laboratory, 18 Back Bay, Boston, Mass.

**Stop Plodding! Be Successful.** Operate a Tire Repair Shop. Make big profits in any locality. We teach you and furnish complete equipments $100 up. Book of Opportunity free. Haywood's, 1312 South Oakley Avenue, Chicago.

**Dollars yearly in your backyard.** No mushroom dope. Particulars free. Metz, 313 East 89th, New York.

**Responsible Manufacturer** wants competent men to manage office and salesmen. $300 to $1500 necessary; will allow expenses to Trenton if you qualify. Address Manager, 536 Forst Richey Bldg., Trenton, N. J.

**Independence**—Our twenty scientific processes put you wise. Excellent. We make money, so can you. Only 50c. Holland Laboratory, Box 473, Astoria, Oregon.

**Foreign Bonds, stocks, drafts and currencies.** All nations. Frank X. Everett Co., 35 Wall St., New York.

**$212.00 a month, spare time work,** no manufacturing or canvassing. Want to know how? Particulars for stamp. Specialty Supplies, 410 Mfgs. Bldg., Denver, Colo.

**Toymakers—Make money at home.** Proposition and blueprints 30c. Weesho-Uko, 31st Station, Detroit, Mich.

## *Chemistry*

**Develop latent finger prints** with non-eradicating powders. With directions 35 cents prepaid. The Rogers Laboratory, Rib Lake, Wis.

**Experimenters Chemical apparatus** and radio supplies. Catalog 5c. Chemical Apparatus Co., 4400 West End, Chicago.

## *Coins*

**44 Different Coins $1.00.** 50 assorted bills $1.00 11 different coins or 11 different bills 25c. Otto Oddehon, Independence, Missouri.

## *Correspondence Courses*

**Used correspondence school courses.** All kinds. Sold on repurchase basis. Big saving. Money back guarantee. Lists free. (Courses bought). Lee Mountain, Pisgah, Alabama.

## *Duplicator*

**Rotospeed Duplicator,** like new, ready to operate, $30.00. Anton Ponsetti, Spring Valley, Illinois.

## *Educational*

**Correspondence courses.** All schools. Lowest prices. Terms. Catalog Free. Mention Subject. Fred. Goetz, 440-H Sansome, San Francisco.

**Used Correspondence School courses** save over half. Bargain catalog 1000 courses free. Used courses bought. Students' Exchange, Dept. A, 47 West 42d Street, New York.

www.americanradiohistory.com

## *Farms, Land, etc.*

**Seized and sold for taxes.** 4½ acres on Georgian Bay $40.50. 12½ acres fur farm $43.20. 25 acres hunting campsite $60.30. 50 acres Muskota Lake District $63.00. 100 acres hunting and trapping $91.80. 160 acres farm Canadian West $315.00. Mining claim near mines that have paid millions $378.00 These prices are not first payments, or price per acre, but the total amount asked. Also beautifully situated hunting and fishing camps for moose, deer, caribou, ducks, partridge, trout, whitefish, bass, etc., best in North America. Summer cottage sites, farms, heavily wooded tracts, acreages large and small, for pleasure and investment, all offered at ten cents on the dollar of their value, and on easy monthly payments of $5. and upwards. Send for illustrated list describing the above and hundreds of other properties seized and sold for taxes. Every property is fully described and offered at a stated price. Send no money. Send for list today so you will have first choice. Tax Sale Service, Room 618, 72 Queen Street, West, Toronto 2, Ontario, Canada.

## *For Advertisers*

**I write letters, folders, booklets,** complete followup for manufacturers, mail order dealers. Long experience. Write for details. L. Taylor, Box J44, Freeport, Ill.

**Drawings—Cuts—Printing**—that tell your story. Webbe Art Engravers, Willoughby, Ohio.

## *For Inventors*

**Unpatented Ideas Can Be Sold.** I tell you how and help you make the sale. Free particulars (Copyrighted). Write W. T. Greene, 809 Jenifer Bldg., Washington, D. C.

**Your Chemical problems solved** and working process furnished for Five Dollars. Write me. W. Stedman Richards, Consulting Chemist, Box 2402, Boston, Mass.

**Inventors**—Get this pamphlet, "What to Invent." No theory or guess work, but things actually asked for by manufacturers. Sent prepaid for only $1.00. Inventor's Syndicate, 22 Paladium Bldg., St. Louis, Mo.

**Cashing In**—If you have a practical, useful invention to sell, write promptly American Patents Corporation, Barrister Building, Washington, D. C.

**U. S. and foreign patents,** trademarks, moderate rates, 22 years experience, George C. Helmicke, 32 Union Square, New York. registered in U. S. and Canada.

**Mechanical drawing** and designing work. Send sketch for free estimation or write for free particulars. Tobler Engineering Bureau, Box 295, Waterbury, Conn.

**Suggestions for Inventors** as to Inventions needed. Price 50c. Tobler, Box 295, Waterbury, Conn.

## *For the Photographer*

**Have you a Camera?** Write for free sample of our big magazine, showing how to make better pictures and earn money. American Photography, 118 Camera House, Boston, 17, Mass.

## *Games and Entertainment*

**Free with $25 order** our large die box. Send 20c for our large catalogue of tricks, puzzles, wigs, sensational escapes, Oaks Magical Co., Dept. 549, Oshkosh, Wis.

**Book of Magic, Set Trick Cards,** and illustrated Catalog 10c. Piedmont Novelty Shop, Box 631, Danville, Va.

**Magic tricks, books, novelties.** Catalogue FREE. Peltier, Dept. 1A, 58 Skeele St., Willimansett, Mass.

**Tricks—Jokes—Novelties,** Catalog free. Kelley, 32 Ellsworth, Worcester, Mass.

## *Health*

**Tobacco Habit Banished.** No matter how long you have been a victim, no matter how strong your craving, no matter in what form you use tobacco, there is help for you. Just send postcard or letter for our Free Book. It explains everything. Newell Pharmacal Co., Dept. 788, Clayton Station, St. Louis, Mo.

**Edison's Way**—Scientific Proof. Natural Diet, 20c. Better Foods Bureau, Willoughby, Ohio.

## *Help Wanted*

**Silvering Mirrors, French plate.** Easily learned, immense profits. Plans free. Wear Mirror Works, Dept. 36, Excelsior Springs, Mo.

**All men-women,** 18 to 60, wanting to qualify for Government Position, $140-$225 monthly, local or traveling, write, Mr. Ozment, 293, St. Louis, Mo., immediately.

**Detectives Earn Big Money.** Travel. Excellent opportunity. Great demand everywhere. Experience unnecessary. Particulars free. Write. American Detective System, 1974 Broadway, N. Y.

**Detectives Needed Everywhere.** Work home or travel. Experience unnecessary. Write. George Wagner, former Government Detective, 1968 Broadway, N. Y.

**Qualify for $150-$300** railroad jobs. Fireman, Brakeman, Baggageman, Sleeping Car or Train Porter. 897 Railway Bureau, East St. Louis, Ill.

**Earn $10 to $20 per day.** Learn Sign Painting, Auto Painting, Paperhanging, Decorating, Show Card writing at a real school—no mail courses. All practical training—short time. Low cost. Chicago Painting School, 132 West Austin Ave., Chicago, Ill.

**Be a Detective.** Work home or travel. Experience unnecessary. Particulars free. Write, George Wagner, former Government detective, 1968 Broadway, N. Y.

**Boys make money at home copying names.** Address Wright, 150 N. 15th St., East Orange, N. J.

**U. S. Government Jobs.** Men-women 18 up. $95 to $250 month. Steady work. Life positions. Short hours. Vacation with pay. Common education sufficient with our coaching. List positions and full particulars, free. Write today sure. Franklin Institute, Dept. P19, Rochester, N. Y.

## *How To Entertain*

**Plays, musical comedies and reviews,** minstrel music, blackface skits, vaudeville acts, monologs, dialogs, recitations, entertainments, musical readings, stage handbooks, make-up goods. Big catalog free. T. S. Denison & Co., 623 So. Wabash, Dept. 99, Chicago.

## *Insects Wanted*

**Why Not Spend Spring, Summer and Fall** gathering butterflies, insects? I buy hundreds of kinds for collections. Some worth $1 to $7 each. Simple outdoor work with my instructions, pictures, price-list. Send 10 cents (not stamps) for my illustrated Prospectus before sending butterflies. Mr. Sinclair, Dealer in Insects, Dept. 41, Box 1424, San Diego, Calif.

## *Instruction*

**Correspondence Courses sold complete;** one-third usual prices because slightly used; easy terms; money back guarantee. All schools and subjects. Write for special Free catalog. Courses bought for cash. Economy Educator Service, H202, West 49th St., New York.

## *Machinery and Tools*

**Concrete Building Block** Machines and Molds. Catalogue free. Concrete Machine Co., 5 N. First St., St. Louis, Mo.

## *Mail Order Business*

**$1 Starts You** mail order business. Particulars Free. Bela Co. (Importers), Los Angeles.

**Business Progress, Magazine,** The mail dealers' guide. Three months trial 25c. Landers Agency, 678 Upham St., Malden, Mass.

## *Manufacturing*

**Mechanical Work:** all branches. Perfect models. Articles manufactured to order. Reliable. Parma Engineering Works, Brooklyn Station, Cleveland, Ohio.

**New invented articles for manufacturers.** Tobler Engineering Bureau, Box 295, Waterbury, Conn.

## *Miscellaneous*

**Homeopathic** and Brochemic preparations sent postpaid to all parts of the world. Manual and booklets free. Halsey Bros. Co., 615 St. Clair St., Chicago, Ill. Established 1855.

**Motor Campers!** We supply camp car plans for amateur builders. Pacific Vehicle Works, Box 574, Los Angeles.

**Beautiful registered bull pups $15. Bulldogs,** 501 Rockwood, Dallas, Texas.

**Gummed Labels, Name and Address,** 500, 2 lines 30c. 3 lines 50c. Catalogue. Eastern Label Co., Y Clintonville, Conn.

**Moving Picture Films!** Westerns, Comedies, Cartoons, Everything! Big Assortment, $1.00. Write Quick. No stamps. W. C. Gillis, 52 Winship St., Brighton, Mass.

## *Motorcycles—Bicycles*

**Don't buy a Bicycle Motor Attachment** until you get our catalogue and prices. Shaw Mfg. Co., Dept. 6, Galesburg, Kansas.

## *Musical Instruments*

**Violins—Deep, Mellow, Soulful**—on easy credit terms. High grade, wonderful instruments of my own make. Development of many years' expertness. Write for book. Gustav A. Henning, 2424 Gaylord St., Denver, Colo.

## *Old Coins*

**California Gold,** quarter size, 27c; half-dollar size, 53c. Columbian nickel and catalogue, 10c. Norman Shultz, Box 146, Colorado Springs, Colo.

**German Govt. Bond.** 100,000 Mk. 1923 $1.40, 5,000,000 Mk bond 1924, $1.50. 100,000 Mk. bill and catalogue 10c. Norman Shultz, Colorado Springs, Colorado.

**Bunker Hill Half Dollar 95c. Columbian Half Dollar 75c.** Large Cent and bargain price list 10c. Marcy, Box 483, Muskogee, Okla.

## *Old Money Wanted*

**$2 to $500 Each** paid for hundreds of Old or Odd Coins. Keep all old money, it may be very valuable. Send 10c for new illustrated Coin Value Book, 4x6. Guaranteed Prices. Get Posted, We pay Cash. Clarke Coin Company, 14 Street, LeRoy, N. Y.

## *Patent Attorneys*

**Patents.** Send for free booklet. Highest references. Best results. Promptness assured. Send model or drawing for examination and opinion. Watson E. Coleman, Patent Attorney, 644 G Street, N. W., Washington, D. C.

**Unpatented Ideas Can Be Sold.** I tell you how and help you make the sale. Free particulars (Copyrighted 1923). Write W. T. Greene, 809 Jenifer Bldg., Washington, D. C.

**"Inventor's Advisor,"** the valuable Patentbook with 139 Mechanical movements and illustrations, sent free upon request. M. I. Labiner, Patent Attorney, 3 Park Row, New York.

**Get your own patents.** Application blanks, complete instructions $1. Cutting Bros., Campbell, Calif.

**Patents.** Time counts in applying for patents. Don't risk delay in protecting your ideas. Send sketch or model for instructions or write for Free book, "How to Obtain a Patent" and "Record of Invention" form. No charge for information on how to proceed. Communications strictly confidential. Prompt, careful, efficient service. Clarence A. O'Brien, Registered Patent Attorney, 92F Security Bank Building (directly across street from Patent office), Washington, D. C. See page 1041.

## *Pat*

**Patents Pr**
hensive, exper
development
nished witho
for disclosing
Owen Bldg.,
York.

**Patents:** T
Office. Cons
150 Nassau

**Inventors**
tain simple
book Patent
Lacey, 644 F

**Millions spe**
Patent yours a
how to protect
we help you
Kresge Bldg., W

**Patents**—Send
signed and witnes
Lancaster and All
United States and
D. C.

**Monroe E. Miller,** O
ent Lawyer, Mechanical
priority record blank grati

**Patents:** My fee in Inst
Frank T. Fuller, Washington,

**Richard E. Babcock,** Patent L
Trust Bldg., Washington, D. C.

## *Patents*

**Inventions commercialized.** Patented or unpatented. Write Adam Fisher Mfg. Co., 205 Enright, St. Louis, Mo.

## *Photography*

**Send Us Your Films.** We develop, print, enlarge. Careful attention to details that make superior quality pictures. Rolls developed 9c, prints 3c each, trial 6"x8" enlargement in folder 40c. Wellington Photo Services, Riverdale, Md.

## *Photoplays Wanted*

**$$$ For Ideas.** Photoplay Plots considered in any form. Write for free booklet. Universal Scenario Corporation, 223 Security Bldg., Western and Santa Monica Blvd., Hollywood, Calif.

## *Printing Outfits and Supplies*

**Print your own cards,** stationery, circulars, paper, etc. Complete outfits $8.85; Job Presses $12, $35; Rotary $150. Print for others, big profit. All easy, rules sent. Write for catalog presses, type, paper, etc. Press Company, A-6 Meriden, Conn.

**Build Your Own: $1.00 up.** Simple, Practical. Blue Print, etc., 50c. Arts-Craft Press, Willoughby, Ohio.

## *Salesmen Wanted*

**Take orders for coffee,** sugar, flour, meats, canned goods, staple groceries, also paints, radio sets, tires, auto and tractor oils. No capital or bond required. We deliver and collect. Permanent business. Big pay. Write at once. Hitchcock-Hill Co., Dept. 83, Chicago.

**Sells for $9.75.** Prints ad on wrapping paper, envelopes, etc. $4.00 commission. Send 10c for sample work. Automatic Ad-Stamper, Joplin, Mo.

## *Song Poems*

**Song Poem Writers**—Send for proposition. Ray Hibbeler, D24, 4010 Dickens Ave., Chicago.

**Song poems wanted.** Radio Publicity, Bureau S, 24 Times Square Station, New York.

## *Stammering*

**St-Stu-T-T-Tering and Stammering Cured at Home.** Instructive booklet free. Walter McDonnell, 105 Arcade, 1126 Granville Ave., Chicago, Ill.

**Stop Stammering.** All speech defects successfully corrected. Samuel Robbins, 399 Boylston St., Boston.

## *Stamps and Coins*

**Stamps 100 All Different 3 cents.** S. I. Quaker Stamp Company, Toledo, O.

## *Stories or Manuscripts Wanted*

**Stories, poems,** descriptive articles, plays, etc., are wanted for publication. Submit Mss or write Literary Bureau, 165, Hannibal, Mo.

## *Typewriters and Ribbons*

**Used Typewriters,** $16.50 Guaranteed. Ribbons 3 for $1.00. Wm. Phelps, 4 Franklin Street, New York.

**Typewriters, all standard makes.** $10 up. Fully guaranteed. Free trial. Write for complete illustrated lists. Northwestern Exchange, 121 N. Francisco Ave., Chicago.

## *Ventriloquism*

**Ventriloquism taught** almost anyone at home. Small cost. Send 2c. stamp today for particulars and proof. Geo. W. Smith, Room S77, 125 N. Jefferson Ave., Peoria, Ill.

## *Wanted*

**Detectives Earn big Money.** Work home or travel. Experience unnecessary. Write. George Wagner, former Government Detective, 1968 Broadway, N. Y.

www.americanradiohistory.com

IDA

*Beautiful*
*d in America*

# BUY
# An Ideal Homesite
## *In Florida's most Beautiful Section*

## VILLA TASSO

### *On Bluffs Overlooking Chotawhatchie Bay*

Northwest Florida is just being discovered. In this glorious spot, Florida's most beautiful section—50 miles East of Pensecola, on bluffs overlooking the beautiful Choctawhatchie Bay—lies Villa Tasso with its delightful Homesites.

A newly discovered Florida dreamland abounding in opportunities—Healthful, Invigorating climate with pure soft water all year round. In the shadow of Magnolia, Pine, Oak, Holly and Palmetto trees, and adjoining national forest, and looping the old Spanish trail giving all the delights of safe bathing beach, hunting, fishing, boating, riding, golf, etc. Freight and Passenger Steamer Service. Beautiful Appalachian scenic highway leads directly to Pensecola, one of Florida's most magnificent cities.

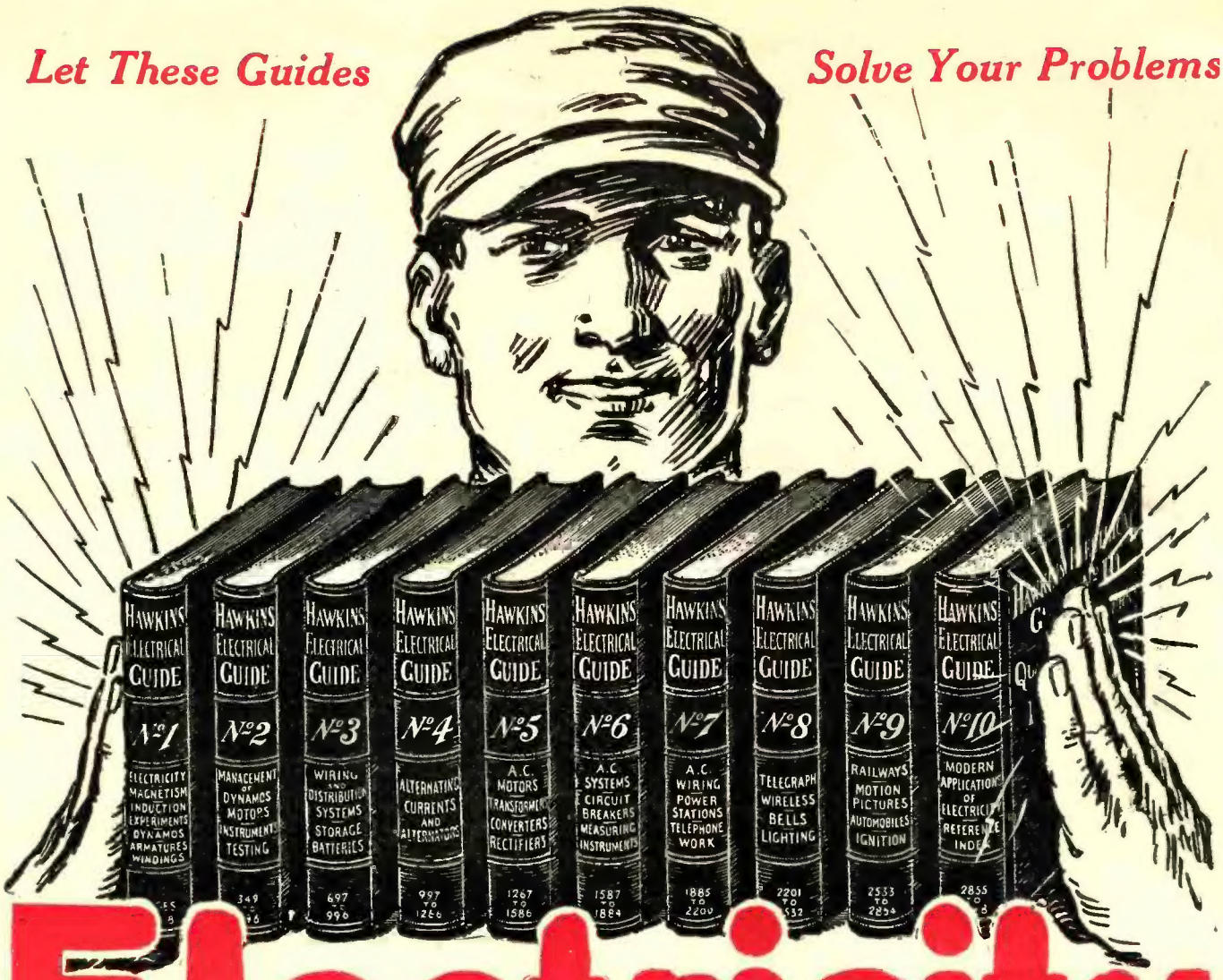
Lots average 50 x 150, average elevation 16 feet, guaranteed high, desirable for building. Now offered for three hundred to two thousand dollars with perfect title. Prices have quadrupled in 3 years and values are rapidly advancing. Reasonable terms.

These prices are a fraction of the cost of other Florida property. Buy now for a homesite or for investment. Write immediately for information to T. V. Orr, Villa Tasso Lodge, Temporary Post Office, Bolton, Florida.

*An Ideal for You*
*In Undiscovered Florida*

www.americanradiohistory.com

*Let These Guides* *Solve Your Problems*




# Electricity at your finger ends

## HAWKINS ELECTRICAL GUIDES IN TEN VOLUMES

**3500 PAGES** **$1 A VOLUME**
**4700 PICTURES** **$1 A MONTH**

Know the facts in Electricity. They mean more money and better position for you. Hawkins Guides tell you all you need to know about Electricity. Every important electrical subject covered so you can understand it. Easy to study and apply. A complete, practical working course, in 10 volumes. Books are pocket size; flexible covers. Order a set today to look over.

**LEARN ALL ABOUT**

Magnetism—Induction—Experiments—Dynamos—Electric Machinery—Motors—Armatures—Armature Windings—Installing of Dynamos—Electrical Instrument Testing—Practical Management of Dynamos and Motors—Distribution Systems—Wiring—Wiring Diagrams—Sign Flashers—Storage Batteries—Principles of Alternating Currents and Alternators—Alternating Current Motors—Transformers—Converters—Rectifiers—Alternating Current Systems—Circuit Breakers—Measuring Instruments—Switchboards—Wiring—Power Stations—Installing—Telephone—Telegraph—Wireless—Bells—Lighting—Railways. Also many Modern Practical Applications of Electricity and Ready Reference Index of the ten numbers.

**SHIPPED FREE**

Not a cent to pay until you see the books. No obligation to buy unless you are satisfied. Send Coupon now—today—and get this great help library and see if it is not worth $100 to you—you pay $1.00 a month for ten months or return it.

**SEND NO MONEY—SEND ONLY THIS COUPON**

**THEO. AUDEL & CO.**
**65 West 23rd Street, New York City**

Please submit me for free examination, HAWKINS ELECTRICAL GUIDE (Price $1 a number). Ship at once prepaid, the 10 numbers. If satisfactory, I agree to send you $1 within seven days and to further mail you $1 each month until paid.

Name .....

Occupation .....

Employed by .....

Home Address .....

Reference .....

S. I., April

www.americanradiohistory.com

# FREE RAILROAD FARE TO CHICAGO IF YOU ACT NOW!

# ELECTRICITY

## —Pays Big Money to Men Who Train the COYNE Way, on Real Equipment, in Great Shops!

If you are going to train for one of the thousands of BIG-PAY opportunities in the fascinating Electrical Field, why not train on real, gigantic electrical equipment such as you will find in the great Shops of COYNE at Chicago, the electrical center of the world? COYNE training is thorough but easy to understand, because EXPERT instructors guide you at every turn as you work with your own hands on big modern apparatus.

Student Winding Stator in COYNE Shops

Students Constructing Outdoor Sub-Station at COYNE

## COMPLETE ELECTRICAL TRAINING IN 12 HAPPY WEEKS AT COYNE

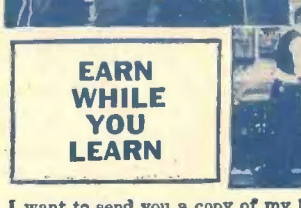
My newly enlarged Electrical Course is the result of 27 years of experience, solving the needs of young men and of the Electrical Field. COYNE has been teaching Electricity in a PRACTICAL way since 1899 and has a worldwide reputation.

My course is thorough, easy to master, and fits men for BIG Electrical jobs, the HIGH-SALARIED *thrilling* jobs. *Act today!*

H. C. LEWIS, President Coyne Electrical School

*Students producing "artificial lightning" on Tesla coil in great shops of COYNE*

**HUNDREDS OF COYNE-TRAINED MEN EARN $60 TO $200 A WEEK**



*Students operating large switchboard at COYNE*

## We Teach Electricity and Nothing Else!

COYNE Teaches only ONE thing—ELECTRICITY. We are SPECIALISTS. Our interests are not divided, nor is Electricity a side line or merely an "additional" subject with us.

## *You Don't Need Advanced Education or Experience*

Don't worry if you lack advanced education, knowledge of higher mathematics or experience. My course is not something that you merely learn from books and letters. It is a *practical*, LEARN-BY-DOING Course. Every COYNE student receives INDIVIDUAL and PERSONAL instruction, on COMPLETE electrical apparatus, under EXPERT INSTRUCTORS, in COYNE Shops at Chicago.

**Be sure to get Coupon in the mail today!**

**EARN WHILE YOU LEARN**

## *You Can Start Any Day of the Year at COYNE*

COYNE Electrical School is open thru the entire year. There are no seasons, semesters or classes. Therefore you can enroll any time. The best time is RIGHT NOW.

**Right this minute is the time to mail the Coupon for your copy of my amazing Big Electrical Book and the Full Particulars!**

## SEND COUPON NOW

H. C. LEWIS, President,
COYNE ELECTRICAL SCHOOL
1300-10 W. Harrison Street
Dept. 5334, Chicago, Ill.

Dear H. C.—I sure want one of those big, handsome 12 x 15 books, with 151 actual photographs printed in two colors. Please don't get rid of all of 'em without sending me one of the FREE copies. I want the facts without placing me under any obligation. Be sure to tell me all about your limited offer of *Railroad Fare and Two Big Extra Courses.*

*Name* .....

*Address* .....

I want to send you a copy of my big, attractive Electrical Book. It is 12x15 in size and contains 151 photos of electrical scenes and operations. Tells about dynamos, radios, autos, airplanes, farm lighting and power, etc. *Absolutely FREE. Remember.*

# COYNE ELECTRICAL SCHOOL

H. C. LEWIS, President — Established 1899

**1300-10 W. Harrison St., Dept. 5334, Chicago**

***Not a Correspondence Course; All Practical, Personal Training***

## RAILROAD FARE TO CHICAGO

INCLUDED WITHOUT EXTRA COST IF YOU ENROLL NOW!

Learn in Chicago, the Electrical Center of the World. There is no substitute for personal, practical training in great shops. Write immediately for Big FREE Electrical Book and details of my amazing offer.

www.americanradiohistory.com